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Six Languages in Education—Looking for Postformal Thinking

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Teachers, learners, and other stakeholders in education often use the same words but do not always seem to communicate very well. This article describes 6 hierarchically inclusive ways of knowing that shape and affect the perception and experience of learning and teaching. The model presented is based on 3 decades of research, over 1,200 student narratives and some 70 educator narratives. A way of knowing acts like a language providing a window into the idiosyncratic meanings that words and concepts are given and that lead to unacknowledged misunderstandings. Core conceptions and understandings are illustrated, major differences between the levels of thinking are highlighted, and the effect on learning is described. Many of the 21st century skills are associated with more complex ways of knowing. Study success is a major driver of development. A developmental pedagogy or curriculum therefore needs to include tasks and assessments that require and credit more complex thinking. Educating for complex thinking is not limited to higher education or to adult development but is appropriate for all ages.

Keywords: learning-teaching conceptions, phenomenography, conceptions of understanding, conceptions of a good textbook

There are situations in teaching—experiences of students, teachers, and school management—that demonstrate that teaching and learning do not always fit together well. These experiences can lead to disappointment, frustration, and disengagement. That is unfortunate, as seeing young minds unfold is an experience that gives meaning to the life of a teacher, and students remember warmly the teacher that really “taught them something important.” What can we do to prevent these frustrating situations? How can teachers ensure that students understand what type of learning and learning products are expected of them so they then can

be successful? When teachers do not understand why their explanations remain a mystery to the student, or students cannot seem to get their head around what the teacher is asking, chances are that either will eventually give up. How is it possible that when teacher and learner are using the same words in the same language, they seem to be talking at cross purposes about learning and teaching? That is the central question we are trying to answer here. This article reflects the authors’ keynote presentation at the third European Society of Research in Adult Development (ESRAD) Symposium in Freiburg, Germany in 2013 and summarizes over 30 years of research into student thinking on learning and good teaching.

In 1984, Van Rossum and Schenk reproduced the five learning conceptions that had been found in a sample of Swedish students (Säljö, 1979) and linked these to study strategies and learning outcomes (Biggs & Collis, 1982). In a series of subsequent studies learning conceptions were linked to conceptions of good teaching and various other concepts such as understanding, applying, insight, intelligence, and so on (van Rossum, 1988; Van Rossum, Deijkers,

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& Hamer, 1985; Van Rossum & Taylor, 1987). A sixth learning conception was first described in 1987 (Van Rossum & Taylor, 1987) and it was corroborated a few years later by Marton, Dall’Alba, and Beaty (1993) and again by Beaty, Dall’Alba, and Marton (1997). It seemed that specific sets of conceptions always occurred together forming profiles of ways of meaning making. In particular, the learning and teaching conceptions proved to be closely and logically linked, leading to the development of a six-stage developmental model of learning–teaching conceptions (van Rossum & Hamer, 2003). The six-stage model is hierarchically inclusive, meaning that each new way of knowing is a more complex way of meaning making and includes all the skills and strategies of the previous ways of knowing. In Table 1 the original five learning conceptions found by Roger Säljö are linked to van Rossum and Hamer’s developmental model.

Over the decades, Van Rossum and Hamer elaborated further on the strong similarities between their learning–teaching conception model and other developmental models of intellectual (Perry, 1970) and epistemological development (e.g., Baxter Magolda, 1992, 2001; Belenky, Clinchy, Goldberger, & Tarule, 1986/1997; Kegan, 1982, 1994; King & Kitchener, 1994; Kuhn, 1991; Labouvie-Vief, 1990). The stories of more than 600 students in Dutch higher education formed the foundation for the six-stage developmental model of student thinking about learning and good teaching (van Rossum & Hamer, 2010). In 2010 they adopted the terms *ways of knowing* and *orders of consciousness* (Kegan, 1982, 1994) as alternatives for referring to profiles of linked conceptions. Their 2010 model included data on teachers’ conceptions of learning and good teaching, proposing the model to reflect both student and teacher thinking (Richardson, 2012). As of 2015, the evidence base for the model has doubled in size comprising slightly more than 1,200 student narratives and about 70 teacher narratives. Van Rossum and Hamer (2011, 2013a, 2013b; Hamer & van Rossum, 2016) have expanded on the conceptions of understanding, adding conceptions of assessment and views on a good textbook. In Table 2, Van Rossum and Hamer’s six-stage developmental model of student and teacher thinking is compared to a range of epistemological models, including in the final col-

Table 1
Säljö’s and Van Rossum Hamer Models of Learning Conceptions

	Säljö, 1979 Learning conception	van Rossum and Hamer, 2010 Learning conception	Teaching conception
1. Learning as the increase of knowledge	Increasing knowledge	Imparting clear/well structured knowledge	Transmitting structured knowledge (acknowledging receiver) Interacting and Shaping
2. Learning as memorizing	Memorizing	Reproducing structured knowledge	
3. Learning as the acquisition of facts, procedures etcetera, which can be retained and/or used in practice	Reproductive understanding/application or application foreseen ^a	Interacting and Shaping	
4. Learning as the abstraction of meaning	Understanding subject matter	Challenging to think for yourself/developing a way of thinking	Dialogue teaching Mutual trust and authentic relationships: Caring
5. Learning as an interpretative process aimed at the understanding of reality	Widening horizons	Dialoguing	
6. —	Growing self-awareness	Mutual trust and authentic relationships: Caring	

^a In earlier publications, we used the label “more than memorizing.”

Table 2
Comparing Developmental Levels Across Different Epistemological Models and Models For Complexity of Learning Outcomes

	van Rossum and Hamer, 2010	Baxter Magolda, 1992, 2009	Belenky et al., 1986/1997	Perry, 1970, 1981, 1988	Kuhn, 1991, 2001, 2005	Kegan, 1982, 1994	Biggs and Collins, 1982
Learning conception	Teaching conception	ERM	Womens ways of knowing	Pilgrims progress	Epistemological theories	Orders of consciousness	SOLO taxonomy
1. Increasing knowledge	Imparting clear/well-structured knowledge	Absolute knowing	Silence	Basic dualism (position 1)	Realist	First order	
2. Memorizing	Transmitting structured knowledge (acknowledging receiver)	Transitional knowing	Received knowledge	Dualism (position 2,3)	Absolutist	Second order	Unistructural simple multi-structural
3. Reproductive understanding/ application or foreseen	Interacting and Shaping	Transitional knowing	Subjective knowledge	Multiplicity (position 4a)	Multiplist	Third order Traditionalism	Multi-structural
4. Understanding subject matter	Challenging to think for yourself/developing a way of thinking	Independent knowing	Procedural knowledge	The way they want you to think (position 4b)	Objective evaluator	Fourth order Modernism <i>Self-authorship</i>	Relational
5. Widening horizons	Dialogue teaching	Self-authored knowing	Constructed knowledge	Relativism (position 5)	Conceptual evaluator	Fifth order Postmodernism <i>Self-transforming</i>	Extended abstract
6. Growing self awareness	Mutual trust and authentic relationships: Caring	Internal foundation	Constructed meaningful life ^a	Commitment (position 6 and beyond)	Reconstructive	Postmodernism (<i>Self-defining</i>) ^a	

Note. ERM = Epistemological Reflection Model.

^a van Rossum and Hamer, 2010.

umn the link observed in Van Rossum and Schenk (1984) to the SOLO taxonomy measuring learning outcome responses (Biggs & Collis, 1982). The developmental nature of the epistemological models included here has been supported by longitudinal data collection. Perry (1970) and van Rossum and Hamer (2010) followed students from freshman year through graduation, providing multiple examples of respondents describing their thinking at increasing levels of complexity. Baxter Magolda followed her initial respondent group from 1986 to 2008 (Baxter Magolda, 1992, 2009), tracking the epistemological development of some 39 of her original respondents over two decades and exploring how career and life, and epistemological development affected each other over the years.

In communicating to teachers and nonresearchers the way the model of learning-teaching conceptions could clarify miscommunications in the classroom, the metaphor of languages proved helpful to explain how ways of knowing or learning-teaching conceptions influenced how people interpreted their experiences (Hamer & van Rossum, 2010). Each way of meaning making is likened to a unique language containing clues to the way people made sense of reality. A learning-teaching conception provided a window onto a unique interpretation and understanding of all kinds of words and concepts, explaining how a listener may hear something totally different from what a speaker meant to say. As the same words are used in all six different languages (e.g., good teaching, real learning, understanding, applying, intelligence etc.) although they mean different things to different people, it becomes obvious how misunderstandings may occur without parties noticing or understanding how they happened.

Much like actual languages, in principle students and teachers can learn to speak them all although Kegan did liken the shift to a new language to teaching people “to unspeak their native tongue” which is much more difficult than teaching people “to speak a foreign language” (Kegan, 1994, pp. 289–290). In particular, the shift between the third and the fourth level languages, which in many ways reflect almost mirror image interpretations (see below), appears to be particularly difficult. Both Baxter Magolda and Van Rossum and Hamer acknowledged this by introducing the concepts of the

crossroads (Baxter Magolda, 2001) and the watershed (van Rossum & Hamer, 2010).

The aim of this article is to discuss the differences between the different languages, illustrating the effects of each language on the meaning making in the learning-teaching environment. Each language stands for a more complex way of interpreting reality. In learning to speak a different language for learning, one retains access to all the strategies and approaches to learning the language used before. However a more complex language gives access to new approaches and enables learners to describe, handle and solve new, more complex issues better. Things that previously were impossible to observe and analyze, now are open to scrutiny, analysis and comment. By learning a new, more complex way of thinking learners step out of embeddedness (Kegan, 1994).

Method

Participants

All student-participants included in the studies over the decades studied at Dutch educational institutes where the second author was employed, from 1990 onward all were the second author's students. The teachers included were either former colleagues of the second author or educational experts from the authors' network. All respondents were aware of the research purpose and gave informed consent to use their responses. Names used to refer to respondents are pseudonyms ensuring anonymity. As of 2015, there are 1,208 separate student narratives and 72 narratives of higher education educators and managers.

Data

The student narratives underpinning this model were collected over three decades, originally using hard copy questionnaires with a small number of open-ended questions requiring long essay type responses. From the early 1990s onward, data collection mixed paper based, electronic questionnaires and e-mail follow-up conversations (van Rossum & Hamer, 2010). All questionnaires included at least one question requesting personal views on learning, good teaching or understanding, providing a link to the learning-teaching conception framework.

Analysis

The student and teacher essays and follow-up responses were analyzed using the whole-of-transcript approach (Bowden & Walsh, 2000) within a phenomenographic context (van Rossum & Hamer, 2010). Phenomenography is a “method for describing qualitatively different ways in which people understand or conceptualize an aspect of their world . . . , focusing on the point of view of the respondent” (Pratt, 1992, p. 204) using what phenomenographers call a “second-order” perspective (Marton, 1981). It requires repeated rereading of narratives, noticing characteristic utterances and grouping narratives to reflect ways in which narratives are similar or different from each other and tries “to characterize how things appear to people” (Marton, 1986, p. 33). In the whole-of-transcript approach the complete narratives and all the utterances in it are kept together preserving the relationships between them and the internal coherence of the narrative (van Rossum & Hamer, 2010).

Below the languages are presented in pairs in a table, accompanied by a characterization that summarizes how the different elements relate to each other and form a coherent epistemological ecology (van Rossum & Hamer, 2010) that may prove quite robust and difficult to change. Quotes included, both those taken from previous work and those published for the first time here, were all translated from the original Dutch by the first author who is a bilingual native speaker of Dutch and English. Translations stay close to the original for authenticity, which means that they may contain translated expressions and may at times sound a little stilted. The portraits of the classroom practices are based on a comprehensive literature review regarding how teachers’ views of learning and knowing influence their teaching (van Rossum & Hamer, 2010).

Results: The Six Languages in Education

Languages 1 and 2: Focus on Memorization

As the caption of Table 3 states, the first two languages described here both focus on memorizing. Learning-teaching conception 1 language (LTC-1) reflects the lack of reflection. Taking everything related to learning and

knowing so for granted, that when asked what learning means, respondents often at first seem to fail to understand the question and then often start with “Well, you know . . .” followed by a range of examples presented as explanation and clarification of what they mean.

The crucial difference between these languages is that where LTC-1 speakers aim to know everything, LTC-2 speakers know that selection is essential to study success as there is simply too much to learn and remember. LTC-2 speakers at first rely on the teachers to clarify what needs to be memorized, but over time learn to rely on their own ability to make comprehensive summaries that form the core of their revision strategy. LTC-2s incrementally more critical attitude toward memorization is also reflected in their relationship with the teacher. Although LTC-1 and LTC-2 speakers both are essentially obedient, taking notes and accepting that the teacher is the source of true and certain knowledge, LTC-2 speakers occasionally ask questions, usually for clarification. A signature LTC-2 query is “Will this be on the test?”

LTC-1 and LTC-2 focus on reproducing what is learnt faithfully at a test. At tests, LTC-1 speakers may fill their responses by listing as many facts and examples they can remember that seem in some way relevant to show how much they know—teachers refer to this type of answer as the *all-I-know-answer*. LTC-2 speakers focus more on sequentially reproducing the main lines or procedures as they were taught or memorized, usually including side issues and examples, giving their responses a rather linear or chronological character that Biggs and Collis (1982) described as an “then . . . and then . . . and then . . .” type unistructural or simple multistructural response type.

LTC-2s appreciate more than LTC-1s some diversion in the classroom in the form of humor and small jokes, although both are less tolerant of questions by peers or the teacher that blur the lines between what is essential to memorize and less relevant complexity by highlighting nuance and other perspectives. This focus on clarity comes back in the preference for a textbook, where current language, clear structure (including a preview of the chapter content), keywords in the margin to guide memorization, and test questions at the end are all meant to eliminate

Table 3
The Starting Point—Languages of Knowing and Memorizing: Learning Conceptions 1 and 2

Epistemological dimension	1: Increasing knowledge	2: Memorizing
Characteristic response	Gives examples of learning	Recognizing or focusing on main points, making summaries
What constitutes learning (learning conception)	Memorizing everything	Memorizing main points (initially provided by teacher)
Result or purpose of learning	Knowing a lot	Knowing a lot, selecting main points
Core learning question ^a	— (no reflection)	What do I need to know (for the exam)?
Nature of knowledge	Correct and incorrect answers/facts	Correct, incorrect and (as yet) unknown answers/facts
Authority or source of truth/knowledge	Experts know everything (the truth)	Experts know a lot (the truth)
Student role in classroom	Listening and taking notes	Listening, taking notes, asking questions for clarification
Student–teacher relationship ^a	Obedience	Allowing questions for further explanation, clarification of procedures or expectations
Teacher role in classroom (teaching conception)	Imparting clear/well-structured knowledge, no interruptions	Transmitting structured knowledge (acknowledging receiver), clear explanations, some humor within limits, clarity on what is to be assessed
Understanding ^b	Knowing everything, every word and sentence (for reproduction on a test)	Answering exam questions, reproduction of (certain) knowledge
Application	Comparing what is memorized to reality	Reproducing knowledge at a test
Good textbook ^c		Current language, clear structure: preview, keywords in margin, summary and test questions
Preferred assessment for understanding ^b	Recall of knowledge questions, MCQ and short answer	Multiple choice (for recognizing correct knowledge)
Type of learning outcome (SOLO taxonomy)	Unistructural	Open questions (for recall and reproduction) Unistructural; simple multistructural

^a Hamer and van Rossum (2010). ^b Van Rossum and Hamer (2013a). ^c Van Rossum and Hamer (2013b); Hamer and Van Rossum (2016).

any ambiguity about what is to be memorized and reproduced at the test.

Teachers speaking LTC-1 are rare, but those speaking LTC-2 are quite common in traditional teacher centered and reproduction oriented secondary education. They focus on covering the content of the materials prescribed by the curriculum within the teaching time allowed. They follow the textbook obediently accepting that the authors as experts know better how to prestructure the knowledge to transfer into the heads of the learners without many excursions or use of alternative teaching materials. An average lesson period will consist mostly of lecture style whole-group instruction from the front of the classroom, with the teacher dividing the time between telling the story (describing and explaining the object of the period—teaching by telling), in class practice (of sums or well-structured problems), and checking students' attention, for example, by posing short questions. Recall is activated by regular short oral tests or quizzes testing factual knowledge and the ability to solve sums, familiar problems. Obviously there is time for humor and short diversions, but unexpected occurrences or questions arising rarely are reason to change the lesson plan.

In this type of teaching, explaining strategies are often limited to repeatedly formulating the same message, with perhaps small variation in approach fed by the idea that students may differ in their affinity with theory or practical work or their preferred learning style (e.g., Kolb, 1984; Vermunt, 1996). Before exams, teachers may spend time on additional explanation or revision of subject matter, with teachers focusing on transferring the correct interpretation with little attempts at addressing misconceptions and not expecting input from students outside listening, making notes and recall.

Practicals and extra reading materials are not seen as integral parts of the subject material, or as learning activities that have an added value for the learning result, but as motivational incentives, or as illustrations perhaps intended to link the subject material to the students' interests. Both teachers and students speaking LTC-1 and LTC-2 focus on test questions that call on recall and reproduction of strategies such as multiple-choice items, problems and assignments that look very much like the ones practiced in class or short answer type open ques-

tions asking for definitions, dates, or facts. For example, "What is the definition and unit of resistance?" or "Who financed Christopher Columbus' expedition?"

Languages 3 and 4: Moving From Reproduction to (Re)construction of Knowledge

The next two languages, LTC-3 and LTC-4, are adjacent in the developmental model, but as they reflect the major change from reproductive to constructivist learning, they could not be more different from each other. In this sense these worldviews or languages are almost mirror images in many ways. They exemplify the major leap from algorithmically applying essentially fixed, inflexible procedures and strategies (LTC-3) toward successfully solve problems to heuristic and flexible use and recombining elements of different procedures and strategies and so creating tailored solution strategies to unknown and ill-structured problems (LTC-4). In the caption of Table 4 this essential difference is reflected in contrasting skills and expertise.

LTC-3 speakers carry the selection started in LTC-2 a little further by selecting which knowledge to memorize based on expected future relevance in life and career. To cater for this, they prefer teaching and learning that incorporates illustrations of practical use and practicing with strategies and procedures in increasingly lifelike or career relevant situations. This preference is also observed in the type of textbook they prefer, where clear chapter structure and many examples from practice support memorization. LTC-3s prefer assessment using case studies and assignments providing them with the opportunity to show how they successfully use (apply) their knowledge appropriately and effectively to solve familiar problems they have practiced with earlier. While practicing, students may follow a checklist, ticking off activities as they are completed to make sure all elements are covered, executing protocols as fixed recipes; to solve this type of problems you first must complete A, followed by B and then C, without exploring new paths.

Teachers speaking LTC-3 place a large emphasis on assignments and group work, both in and outside the classroom. The most frequent learning activity is still teaching by telling, but increasingly the teacher refers to daily or pro-

Table 4
The Great Divide—Languages of Skills and Expertise: Learning Conceptions 3 and 4

Epistemological dimension	3: Reproductive application (later); application foreseen	4: Learning to think
Characteristic response	Mentions future, life, career, learning by doing, focus on practical uses, up-to-date examples from professional practice	About thinking, systematic ways of working, taking pride in producing good work
What constitutes learning (learning conception)	Memorizing and practicing what proves important later	Adopting a way of thinking and working
Result or purpose of learning	Solving known (structured) problems	Solving ill-structured problems
Core learning question ^a	What will I need later (in life or my career)?	How do I formulate a good argument, how to approach a complex or ill structured problem?
Nature of knowledge	Answers are facts or opinions; opinions are personal	Answers need to be evidence based
Authority or source of truth/knowledge	Experts do not know more than you	You become the expert
Student role in classroom	Listening, memorizing, application, and discussion (i.e., exchanging opinions)	Thinking for yourself, supporting opinions, analysis and using criteria
Student–teacher relationship ^a	The expert (teacher) doesn't know everything either, I can have my own opinion and all opinions are equally valid and should be respected	A teacher should help me learn to think for myself. Opinions and conclusions need to be evidence based
Teacher role in classroom (teaching conception)	Interacting and Shaping: offering practice, cases, practical, interaction and exchanging opinions	Challenging to think for yourself, develop understanding, mentoring/coaching not steering
Understanding ^b	Applying memorized knowledge and procedures to practical situations (simple)	Making connections between prior and new knowledge, reorganizing knowledge into your own systematic structure
Application	Answering exam questions; Using knowledge algorithmically (in known ways to similar problems) in practice	Using knowledge in flexible ways, within and outside the educational settings; 'creativity' is reached by following disciplinary rules
Good textbook ^c	Good chapter structure, examples from practice and applications help understand and memorize	A book that makes you think, increasing in complexity and depth, examples and images, simplicity in presentation
Preferred assessment for understanding ^b	Frequent testing (parts of total)	Open questions (independent thinking, analytical skills and making connections)
	Open questions (reproduction)	Interesting cases and assignments (application in new/unfamiliar situations)
	Practical cases and assignments (practical application and own ideas)	Questions and cases need to be interesting and motivating
Type of learning outcome (SOLO taxonomy)	Multistructural	Relational

^a Hamer and van Rossum (2010). ^b Van Rossum and Hamer (2013a). ^c Van Rossum and Hamer (2013b); Hamer and Van Rossum (2016).

fessional practice while telling the story, using up-to-date examples and linking subject content to daily life; how and where subject content is used. Although learning is no longer primarily aimed at the test, it is still very important, because before the future arrives, students need to perform well and attain their diploma. This means that practicing problems and doing sums still take up a considerable chunk of the lesson period. Teachers see practicals and group assignments as useful activities and these are put into action more often than in teaching at LTC-2 level. These learning activities are good for learning skills such as following instructions, measuring correctly, automating certain procedures, reporting, et cetera. Quizzing and asking short questions in class are replaced by teacher-dominated Q&A and discussions. The most important outcome of these is the exchange of opinions and an increased awareness of other people's opinions. Often the teacher asks students for their opinions. Usually the focus is the exchange of opinions, where all opinions are seen as equally valid, and not argumentation aimed at informing, influencing, or changing opinions. In education this approach to teaching and learning is characterized by authentic case studies of limited complexity and it often is very similar to problem-based learning.

In an average classroom in secondary education or undergraduate lecture hall at university it is not unusual for three quarters to 90% of the students to speak LTC2 or LTC3 depending on the knowledge and teacher centeredness of the formal education experienced previously (van Rossum & Hamer, 2010; Hamer & Van Rossum, 2015). Where LTC-3 teachers and learners focus on modeling practice or "a way of doing," LTC-4 teachers and thinking focuses on (re)-creating knowledge structures and systemic thinking (Kegan, 1994; Labouvie-Vief, 1990). Connecting facts and supporting conclusions and opinions on evidence are fundamental to evaluation of opinions.

Also, I think it is very important to look for connections between subject matter and other sources/knowledge, so that whatever you learn does not become an isolated item stored in your head somewhere. (p29 in Van Rossum & Taylor, 1986)

[To] have a process of thought that sort of "sets in motion" when you look at something . . . looking at something new in a far more logical way, and seeing the steps and the moves toward arriving at some sort of

conclusion . . . learning is thinking clearer. . . . Perhaps it is just the skill you have learned of thinking more coherently. (Beatty et al., 1997, p. 159)

It is not unusual that learners feel pressured to change the way they are used to thinking, demonstrating that at this level, learners are not yet independent. Study success is still a major driver to change and to succeed students need to figure out what the teacher wants. The story of Naomi in Belenky et al. (1986/1997) is an almost iconic illustration. To pass a course in art history, Naomi is quoted saying she needs

to find out what the guy wants and give it to him. Composition and texture and all that garbage seemed meaningless and unreal to her; but if that was what [the teacher] wanted, that was what she would try to deliver. (Belenky et al., 1986/1997, p. 91)

Once Naomi understands it no longer is the answer itself that is the desired outcome but the ability to construct a systemic argumentation, she experiences a major shift.

But you're the one who's placing the judgment on it and as long as you're substantiating your argument they cannot—they're not going to disagree with—they cannot—it's not a matter of disagreeing, as long as you can substantiate what you are saying. They're teaching you a method and you're applying it for yourself. (Naomi in Belenky et al., 1986/1997, pp. 91–92)

Students quickly realize that to be successful, they need to take—and be given—a larger responsibility for their own learning or they will never learn to think for themselves. Learning is no longer one way, they know they can contribute to understanding if the teacher is "open to new/other views/explanations of theory and stimulates students to think about the theory and to do something with it" (Hester in van Rossum & Hamer, 2010, p. 382).

Both in teacher and learner responses, emotions are mentioned. Learners mention the pride they take in producing good quality work, and teachers emphasize the joy and fulfilment that teaching and interaction with students give them: "In my view, good teaching challenges students and teachers. The student delivers work that he or she has learned a lot from and is proud of. And it works the other way around too, stimulating the teacher in turn" (Mr. Curry, teacher in van Rossum & Hamer, 2010, p. 456).

This way of meaning making is captured by the concept of self-authorship (Baxter Magolda & King, 2012; Kegan, 1994) where the self

authors the perception of reality. However Kegan frames this authoring firmly within a disciplinary perspective. Learners speaking LTC-4 have no difficulty examining, comparing and contrasting different perspectives within a discipline, and they can compare and contrast Newtonian physics and quantum mechanics. Understanding is interpreted as the ability to make connections and the ability to (re)construct a mental model that can be manipulated and examined from different angles in the mind's eye. As a result, the language can have a technical flavor where following analytical procedures, protocols, and approaches seem more important than the outcome. This may be the backdrop for the preoccupation with skills, argumentation and critical thinking have become skills: habitual ways of approaching information or a solution strategy. However, using skills to describe the procedures learned in developing dispositions may be misleading as is illustrated below by discussing the difference between LTC-3 and LTC-4 speakers toward dealing with complexity and uncertainty.

LTC-3 speakers practice what one may call a procrustean view of complexity. Problems of relative simplicity are stretched out to fit the chosen solution strategy, resulting in reduced uncertainty about what to do and the implementation of unnecessary or irrelevant procedures just to "cover the bases" and "tick all the boxes." When confronted with unfamiliar and ill-structured problems, LTC-3 speakers may overlook the deeper complexity and inherent uncertainty, simplifying them by ignoring the too complex aspects of the problem and solving what is left using a familiar solution strategy, thereby potentially setting the stage for what is often then referred to as "unanticipated side effects." In this sense LTC-3 speakers are as intolerant as LTC-1 and LTC-2 speakers of peers or teachers making an issue unnecessarily complex by asking probing questions and introducing uncertainty and ambiguity.

LTC-4 speakers on the other hand, when confronted with an unknown problem, will attempt to break up the problem into smaller elements, aiming to uncover and separate routine elements from those hiding the complexity characteristic of ill-structure problems. Observing the complexity, they proceed to select solution strategies from their existing toolbox together with the rules of the disciplinary approach to

create tailored additions addressing the elements of the problem that cannot be approached with an existing procedure. In this way, LTC-4 speakers represent the flexible performance that is central to the teaching for understanding approach (Perkins, 1993). In this sense it is interesting to note that currently there is a strong focus on 21st century skills, although considering the complexity or supercomplexity of current society (Barnett, 2004) and future problems, it might be better to aim for 21st century expertise or dispositions.

The importance of teaching the (re)construction of mental models through role-modeling inquiry is a central theme in LTC-4 teaching. Contrary to expectations perhaps, teaching by telling remains an important part of classroom practice, taking up about a quarter to one third of the teaching time. However, instead of the transfer of certain knowledge, teaching by telling is used to point out that looking for associations with and connections between existing and new knowledge is called for, and that learning a systemic way of working is what is crucial here. Even more than in LTC-3 classrooms, (oral) quizzes are rare and inquiry, practicals, and discussion are used by students to practice supporting their standpoints with knowledge from earlier lessons, other sources et cetera. The purpose of discussion is to get familiar with building an argument and applying criteria when these are provided. Where in LTC-3 the aim of practicals and assignment was to practice skills, the purpose now is to learn to think for oneself, to make associations between various parts of the subject matter. An example from history could be working with original texts fragments, analyzing how the fragments are connected and then considering why the teacher selected these specific fragments. These two learning-teaching activities, inquiry and discussion, take up more than half the teaching time. Students are expected to apply strategies and skills in a flexible way and adapting them to new and unfamiliar situations. Students are challenged to seek out other sources and develop a critical stance and develop argumentations.

Languages 5 and 6: Moving From Knowing to Being

The shift between LTC-5 and LTC-6 again reflects a major shift in thinking and perspective, captured in the caption of Table 5. The

Table 5
From Knowing To Being—Languages of Excellence: Learning Conceptions 5 and 6

Epistemological dimension	5: Widening horizons	6: Growing self awareness
Characteristic response	Refers to different perspectives, other approaches, holding off judgment because of this	Discussing life goals, choices and living with the outcomes
What constitutes learning (learning conception)	Seeing things from different perspectives	Searching for wisdom
Result or purpose of learning	Personal development	Finding out who you feel you are
Core learning question ^a	What does it look like if I take a different perspective?	What fits me; what perspective, which choices show who I am?
Nature of knowledge	Answers depend on perspective/context/culture: relativism	Choices manifest who you are (ambition, partner and work choices; often socially unconventional)
Authority or source of truth/knowledge	Experts all see things differently, depending on their perspective	Yourselves in search of your identity
Student role in classroom	Equality between student and teacher	Authenticity and respect
Student–teacher relationship ^a	Dialogue teaching: Facilitating dialogue, participating as peer	Mutual trust and authentic relationships: Caring
Teacher role in classroom (teaching conception)		Authenticity and respect; if teacher is an authentic person, teaching techniques are irrelevant
Understanding ^b	Formulating arguments for or against, and using what is learned in your own argumentations from multiple perspectives	The teacher is subservient to my growth as a person A basis to build your life around, a temporary relief from uncertainty, less stagnation in living; getting closer to the self
Application	Approaching questions from different perspectives or disciplines; problem solving in a heuristic and relativist way	Putting knowledge and systems to use for the greater good
Good textbook ^c	Every page leads to more questions, not one truth/perspective, see in a different light	Consists of self-chosen materials, follows own interests
Preferred assessment for understanding ^b	Assignments for assessing taking different/other perspective(s); oral/interview/debate	Life for assessing self-knowledge and the development of self-awareness: 'making your own way'
Type of learning outcome (SOLO taxonomy)	Extended abstract	Extended abstract (no matching level)

^a Hamer and van Rossum (2010). ^b Van Rossum and Hamer (2013a). ^c Van Rossum and Hamer (2013b); Hamer and Van Rossum (2016).

focus seems to shift from asking how to know to asking how to be, which led van Rossum and Hamer (2010) to propose that the sixth language may represent the first stage of a second tier of ontological development.

The major discovery that students make when moving into the next language, LTC-5, is that every way of knowing is a way of not knowing; every disciplinary perspective inherently hides elements and prevents one from seeing all aspects of a problem. And that replacing one set of disciplinary glasses or lenses with another transforms the world, reality, before one's eyes. Kegan refers to this way of meaning making as self-transforming (as cited in Debold, 2012), where there is a self no longer authoring reality but transforming reality by an action. The move to LTC-5 is stepping out of embeddedness, stepping out of one disciplinary perspective. The experience of seeing the world, truth and sound conclusions transform, depending on the perspective taken, makes LTC-5 speakers acutely aware that making judgments is a risky business. Often LTC-5 speakers choose to reserve judgment, refusing to take a position on a host of issues, in this achieving true relativism. Where LTC-3 speakers are relativist in a sense that they feel every opinion is essentially as valid as any other, LTC-5 speakers acknowledge that some outcomes are morally less defensible, but they still refrain from condemning positions as they can empathize with the way the position was arrived at.

In LTC-5 understanding means being able to formulate a range of arguments and arrive at different solutions, each from a different perspective, which leads to nuanced thinking, which in itself can turn into a cynical perspective, where one rejects any system or theory because it is only a theory and all theories are inherently flawed. Perry and Kegan recognized this and have called this negative development gamesmanship or deconstructive postmodernism. To prevent this negative perspective, learners need to find an answer to the question that respondent p3 asked in an early study, "Learning contributes to your identity as a person. You are confronted with so many different viewpoints which you try to cope with while asking yourself "Do I agree with that, do I feel that too?" This can change your own views on certain issues as well" (p3 in Van Rossum & Taylor, 1986).

Given the central role that understanding of different perspectives plays in this language, it is understandable that both students and teachers place great emphasis on dialogue and discussion. So much so, that the teaching conception is named for it. For LTC-3 speakers discussion is aimed at the exchange of different opinions and experiences without the purpose of convincing each other, the latter is precisely the object of engaging in discussion for LTC-4 speakers. For LTC-4, the evidence presented supporting the argument, together with the quality of the reasoning (e.g., logic, elegance) serves the purpose of convincing the other of the higher quality of the standpoint taken. For LTC-5 speakers convincing the other to adopt a standpoint is reduced in importance, and discussion aims at understanding the reasoning that leads to different, perhaps even contradictory outcomes. Students speaking LTC-5 carry the dialogue into their views on a good textbook.

Every page led me to more questions than it gave me answers. . . . A textbook doesn't have to be practical or easy to memorise. It makes for easy reading if it is well structured, but when this is not the case you need to put in more effort, increasing the chance that you learn more. Another reason that a textbook needn't be practical is because a practical book is a book with only one truth. That would be a pity, because I think there are many truths. . . . If you only see one truth, you will have only one perspective. . . . You'll never see anything in a different light . . . and it will never get better. (Stephen, student; Van Rossum & Hamer, 2013a)

The crucial issue of taking different perspectives is also reflected in LTC-5 speakers conception of understanding and its assessment.

More and more I'm becoming convinced that no single idea, no single event and no single person can be interpreted from only one perspective. I feel, the overarching (meta) level required to be able to take different perspectives is conditional in order to say that something or someone is understood. The moment you can debate pro as well as against a proposition, underpinning your arguments, then you have understood a subject well. In that case the subject has become three dimensional. In addition to debating you can show your understanding of an issue by explaining it to someone unfamiliar with it. Although, I feel that this form of understanding may be more superficial than debating . . . understanding means that you can look at an issue from a distance and you can follow different interpretations and build an argument for each of them. (Kate, student; Van Rossum & Hamer, 2013b)

The awareness that people's behavior, inside and outside classroom, reflects other perspec-

tives and other ways of meaning making has a fundamental effect on how teachers shape their teaching. On the surface, teachers speaking LTC-5 do not seem to be incorporating extraordinary activities in their classroom. To see the intricate thinking that has gone into the effort to cater to different perspectives within one physical space-time moment, it is necessary to open a window into how each element is shaped to meet expectations and to challenge them at the same time. Paul Walker described his multiple inclusive approach when explaining he is not proposing a major shift in observable pedagogy or curriculum. In his physics classes

Information is provided in logical order for those who want it, but with the oft-repeated rider that relying on my lectures for complete and accurate information was fraught with danger—I might be mistaken (as I have been many times and not realized it until later) or even deliberately misleading (temporarily, to make a point). For students who need to relate to other course content or to the world, there is a thread of conversation making such links, often unexpected ones. This approach is not unusual; physics teachers often highlight examples and provide practical illustrations of the abstract concepts in physics courses. For students who seek to apply the knowledge, there is at least conversational reference to that, which again is not unusual. But an explicit awareness of inclusively serving the interests and learning approaches of a diversity of students seems to be much less common. (Entwistle & Walker, 2000, p. 345)

On the surface, in observing as an outsider, a typical LTC-5 teaching period still contains a teaching by telling but to a far smaller degree than in any of the other situations described here. Simple knowledge transfer is replaced by activation of students, who now, with the knowledge provided, can construct more complex knowledge themselves. This knowledge construction takes place during practicals and assignments that are followed by discussions about the results and findings and the arguments developed and underpinning various approaches. At this level the teacher often can retreat from active involvement in discussions, and act as mediator by managing the process and encouraging mutual listening. These two activities, practicals or assignments and discussion, take up more than half of the teaching time. Taken together, teaching by telling and collaborative practice take up about one quarter of the time. The rest of the time is used for question-and-answer sessions and creating a good atmosphere by joking and making some

fun: At all levels, humor and small diversions retain a combined share of about 10%. Again, the what of the activities (which activities and the duration) is less important than the how of the activities; how are activities intended and implemented. Are short excursions on conflicting knowledge included in teaching by telling? Are students challenged to look at issues from different perspectives? For example, are law students asked to look at a health care case from the perspective of a nurse? Can knowledge from history on government be revisited and examined in the civics course? The main purpose of this approach is the integration of knowledge. This is characterized by the activation of cross disciplinary knowledge: for example, by actively examining how knowledge of forces can be used to explain molecular polarity and through this the surface tension of fluids.

In an average high school classroom and even in an undergraduate lecture hall, LTC-5 speakers are rare, perhaps one in 20 learners might experience learning and teaching this way. Even among teachers in higher education, this perspective is less common than one might expect from reading mission statements or educational aims of various institutes (Van Rossum & Hamer, 2012). The next language, LTC-6, is even more rare in the data currently collected for the age group 18 to 50, suggesting that a certain level of maturity is required to achieve this perspective. However, even at younger ages occasionally narratives occur that are clearly different in focus, language and voice, as the quotes below will illustrate. For students and teachers speaking LTC-6, teaching techniques seem to have become irrelevant.

I do not really have an idea of what good teaching is. I do know that (this refers more to learning from people than to teaching) as soon as someone tells me “you have to do it this way” I start to bristle. I feel, just show me what, who, how and why you are, do, feel and so forth. . . . Live as you think is right and if I can learn from that (what is almost sure to happen) then I can pick that up myself. . . . I can only become wiser when I want to, you cannot make me. I do feel the latter is valid within teaching. Good teaching is presenting the subject matter in such a way that (for) those already interested it stays that way or becomes more so. (Cora, in van Rossum & Hamer, 2010, p. 14)

However, that is not a reflection of the truth, students have goals and expect two-way conversations with their teachers and mentors. They focus on development of an authentic

relationship with a mentor who brings a greater supply of experience and subject knowledge, but where nothing is fixed and learning becomes a never ending shared journey through time and understanding. The focus on authenticity is clear in Parker Palmer's description of how he teaches from who he is.

... As I teach, I project the condition of my soul onto my students, my subject, and our way of being together. ... Viewed from this angle, teaching holds a mirror to the soul. If I am willing to look into that mirror and not run from what I see, I have a chance to gain self-knowledge—and knowing myself is as crucial to good teaching as knowing my students and my subject. ... When I do not know myself, I cannot know who my students are. I will see them through a glass darkly, in the shadows of my unexamined life—and when I cannot see them clearly, I cannot teach them well. When I do not know myself, I cannot know my subject—not on the deepest levels of embodied, personal meaning. I will know it only abstractly, from a distance, a congeries of concepts as far removed from the world as I am from personal truth. (Palmer, 1998, p. 2)

And the role of teaching technique is subservient to the discovery of how to teach from the personhood, by using techniques and flexibly moving between them so they

reveal rather than conceal the personhood from which good teaching comes. We no longer need to use technique to mask the subjective self, as the culture of professionalism encourages us to do. Now we can use technique to manifest more fully the gift of self from which our best teaching comes. (Palmer, 1998, p. 24)

Teaching in this way requires a certain open mindedness of teachers, a willingness to create a relationship of trust involving a level of risk to established beliefs and practices.

If you are willing to negotiate what to explore and what to develop, you need to be aware that students can make unusual suggestions ... you need to be willing to invest ... to be curious about the pedagogical process unfolding. Such [teachers] very often just love to see how students develop and find their own way ... they really enjoy a student who submits an unexpected idea making them realize that they will be following a path they would not have thought of themselves (Mr. Ford, university dean, Hamer & van Rossum, 2015).

These quotes and the ones that follow, demonstrate that in LTC-6, objectivity and technocratic professionalism are rejected and replaced by commitments that are connected to identity, becoming “who you are” and so acquire an emotional content that affects meaning making in fundamental ways. In that sense, LTC-6

speakers are exploring the answer to the question that LTC-5 speaker p3 asked above, “Do I agree with that, do I feel that too?” In answering this question, LTC-6 speakers find temporary relief from the fundamental uncertainty they recognize everywhere. Sophia, a second year psychology student, describes this in one of the most moving narratives on understanding in the authors' data.

People do not like uncertainty. They try to avoid uncertainty by surrounding themselves with stuff and people or by following a religion that answers their questions. ... By keeping busy living, you can temporarily delay the confrontation with all that is uncertain and especially with death: the ultimate uncertainty. ... Understanding things is another formula for certainty: not understanding something you want to understand leads to uncertainty and frustration makes you keep on looking. Understanding something is a base to build on further and can give relief. You can place what you understand in context and link it to other pieces of the world you have understood. This way you expand your world view with more schemata, concepts, et cetera. By understanding more and more, your life becomes coherent and you can make choices, pursue goals, et cetera. Imagine that you wouldn't understand anything. *Your life would have no direction at all.*

By understanding something, the understood is nearer to yourself. It becomes something you know, or even a part of who you are ... understanding something new gives a feeling of development. You feel progress is made, you learned something. So, there is less stagnation than without understanding.

It would be wonderful if you could live within uncertainty, and still be able to make a good life of it. So that you could die without it being a complete surprise, because you have learned to understand (on a deeper level than rationally) that you will need to let everything go and that you have already practiced a bit with letting go. But that is quite a task ... and extraordinarily remarkable if you succeed.

To assess understanding a qualitative interview would seem appropriate. Topics for this interview could include certainty, closeness to self, context, direction, development and change, and feelings of relief. (Sophia, student; Van Rossum & Hamer, 2013b).

Discussion

Formal higher education is associated with the aim toward development of higher complexity of thinking. However, as said above, the most complex languages LTC-5 and LTC-6 are rare in the collected data. They appear to be rare in general, with examples often taken from literature and biographies, or represented by spir-

itual or philosophical leaders such as, for example, Krishnamurti, Tolstoy, and Gandhi. There is reason to expect that certain dispositions that are currently linked to the 21st century skills set and are in high demand by society, are closely linked to the perspectives associated with the complex ways of knowing that the speakers of these languages demonstrate. Although the nature of these ways of knowing are slowly becoming somewhat clearer, very little is understood of how development through the stages can be encouraged. A focus on study success seems to be able to drive development, however this requires both assessment-for-learning and assessment-of-learning (formerly known as formative and summative assessment) to reflect a developmental pedagogy aimed at skills, competencies, or dispositions that are expressed in these higher order, more complex ways of knowing. Understanding how the complexity of tasks can be used to design assignments and assessments that support such a developmental pedagogy, for example, by empirically exploring links with the model of hierarchical complexity (Commons, 2007) and various epistemological models as discussed above, is necessary. However currently, the literature on understanding and thinking regarding assessment of understanding in mean stream research and higher education seems to be limited to LTC-4 type understanding (Hamer & Van Rossum, 2016). This may be due to the relative scarcity of the most complex ways of knowing and the failure to this day to develop a survey like tool that can be used to identify these rare, complex ways of meaning making. A small group of participants of the ESRAD of 2014 are currently working on developing a set of scales with Likert type items that attempt to address this gap, with initial encouraging outcomes (S. Kjellstrom, H. Golino, E. Almers, R. Hamer & E. J. van Rossum, personal communication, May 26, 2016). But clearly more work is necessary.

Although much research into more complex thinking focuses on young adults, and ESRAD indeed refers to this type of thinking as adult development, there are educational approaches that aim to capitalize on the creativity and epistemological flexibility of younger people and counter the effect of traditional knowledge transfer oriented teaching. In the early years of this century, the International Baccalaureate

(IB) adopted a Learner Profile (<http://www.ibo.org/en/benefits/learner-profile>), describing the aspired learning outcome of an IB education, across all its four educational programs. These programs are offered to over 1 million young people between the ages of 3 and 19, in 150 countries and territories worldwide. IB graduates are to be inquirers, critical thinkers, communicators, who are knowledgeable, reflective, open-minded, caring, principled, courageous, and balanced, reflecting many skills, competencies, and dispositions that are currently linked to the 21st century skills set (Strijbos, Engels, & Struyven, 2015). In expecting younger age groups to succeed in showing these outcomes, the IB seems to agree with Meacham (1990) that complex thinking characteristic of wisdom can be found at all ages, and with Sternberg (1990) that there is no minimum age requirement regarding teaching for complex thinking.

What then besides assessment and formal education may drive development? In the authors' data, young people expressing these complex ways of knowing often have been rudely awakened by trauma. A life-changing event or personal crisis has shaken their identity and led to introspection and evaluation of what is important. Other possible drivers presented at the 2013 ESRAD conference included,

- A privileged lifestyle providing time to think
- Encountering situations in society that demand a different way of thinking
- Opportunity to engage in education or experiences that challenge beliefs and assumptions

However, all opportunities are wasted or indeed may lead to regression (Perry, 1970) or an active rejection of development (van Rossum & Hamer, 2010) if the individual experiencing the opportunity lacks the alertness and open mindedness to recognize the opportunity (McCune & Entwistle, 2011) and the courage to seize it.

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