



ITALIAN JOURNAL OF SOCIOLOGY OF EDUCATION

Editor-in-Chief: Silvio Scanagatta | ISSN 2035-4983

Assessment of Learning to Learn in Early Childhood: An Italian Framework

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Article first published online

February 2016

HOW TO CITE

Stringher, C. (2016). Assessment of Learning to Learn in Early Childhood: An Italian Framework. *Italian Journal of Sociology of Education*, 8(1), 102-128. doi: 10.14658/pupj-ijse-2016-1-6



PADOVA UNIVERSITY PRESS

Assessment of Learning to Learn in Early Childhood: An Italian Framework

Cristina Stringher *

Abstract: Internationally, the importance of non-cognitive competencies determining success in life is widely recognized (Blair, 2002; Heckman, 2008; OECD ESP, 2015). Among long-term outcomes correlated with such competencies, researchers include the capacity of individuals to participate in society and in the labor market; lower crime rates and involvement in health-impairing activities (Heckman, 2008). Learning to learn could play a connecting role between cognitive and non-cognitive competencies (Shonkoff & Phillips, 2000). Listed among the eight European key competencies (EU Communities, 2006), this is a complex concept which has recently re-attracted the interest of researchers worldwide (Deakin Crick et al., 2014; Stipek, 2012). This paper analyses the notion of learning to learn (Stringher, 2014) for the development of an assessment battery providing teachers with essential information on the current state of learning competence in preschool children. This assessment serves formative purposes and represents a basis for interventions geared at children's optimal development, in coherence with national curricular guidelines (MIUR, 2012) and with the recent European Quality Framework for ECEC (EU Commission, 2014). The paper addresses the theoretical basis of tool development, areas of assessment and relevant rationale behind these choices. A roadmap for the empirical phase of the validation study is also sketched.

Keywords: learning to learn, non cognitive competencies, early childhood, assessment

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Introduction

Scope of this paper is an analysis of the notion of Learning to learn (Deakin Crick et al., 2014; Demetriou, 2014; Hautamäki et al., 2002; Hautamäki & Kupiainen, 2014; Rao et al., 2014; Stringher, 2014) as a connecting concept between cognitive and non-cognitive competencies in early childhood (Shonkoff & Phillips, 2000; Stipek, 2012). The result is a theoretical framework supporting the development of an assessment battery providing preschool teachers with essential information on the current state of learning competence in a cohort of children. This assessment serves a formative purpose and represents a basis for subsequent interventions geared at the empowerment of children for optimal development, in coherence with Italian curricular guidelines (MIUR, 2012) and with the recent European Quality Framework for Early Childhood Education and Care (ECEC, EU Commission, 2014). Rationale behind this framework is the importance of nurturing children's learning capabilities early on, with two main purposes: to contrast initial socio-cultural disadvantage; to prevent students' disengagement and drop-out in their progression through the education system.

The task undertaken here is not an easy one: definitions of learning to learn are abundant in the literature and, when used in early childhood education, the concept is often referred to in many different ways, like for example: approaches to learning, learning potential, learning how to learn, executive functions. The need to disentangle this concept from related competencies and to establish its core components is thus stringent.

Children are born with an innate desire to learn: at birth they are already equipped and "ready" to learn (Bingham & Whitebread, 2012; Deci & Ryan, 2000; Montessori, 1999, 2000; Shonkoff & Phillips, 2000). Throughout life, their capacity to learn is gradually developed socially (Stringher, 2014), shaped by the experiences and learning situations which children are exposed to. This capacity is progressively turned into learning capability, fundamental in anyone's life success (Alberici & Di Rienzo, 2014). Yet, environmental circumstances may thwart children's learning potential. Learning potential, which I define as the antecedent of learning to learn in early childhood (i.e., Developmental Learning to learn capacity or Approaches to Learning), has its roots in human psychological needs for competence, autonomy and relatedness (Deci & Ryan, 2002; Janus et al.,

2007; Stringher, 2014). When children's basic needs are not nurtured in their Home Learning Environment (HLE) and in Early Childhood Education and Care (ECEC) or other settings, children's learning potential cannot be fully developed and later gaps in scholastic achievement can be accrued: children's readiness to benefit from formal schooling is impaired early in their career and thus they may accumulate difficulties later in life, such as dropping-out of school and harder socio-cultural and economic conditions.

Children access first grade with varying degrees of competencies, key in their transition to formal education (Anders, 2015). Hair and colleagues (2006) estimated that between 35 and 45% of U.S. children are not ready for school. Children's approaches to learning have been defined as perhaps the most important yet neglected among readiness competencies, a fundamental domain of capabilities supporting other types of learning (Center on the Developing Child at Harvard University, 2011; Kagan et al., 1995; UNESCO, 2013a, 2013b, 2014). In Italy, surveys on literacy and numeracy demonstrate profound inequalities in the performance of Southern disadvantaged youth compared to national average (INVALSI, 2012; 2013), thus disparities are believed to develop before a child starts school. If education is to reduce such gaps, teachers' awareness of children's difficulties is the first step for adequate interventions. This is why child outcomes at the end of preschool and baseline assessment in the transition to primary school are so important. This is also why learning to learn should be prominent in such assessments, in spite of the difficulties connected with any measurement attempt of this complex construct: success in life is built very early, learning to learn seems of paramount importance to nurture especially during the early years, yet the measurement of early antecedents of learning to learn with a comprehensive and coherent set of tools is generally neglected and only a few aspects of this notion are tested in preschools.

Internationally, the importance of non-cognitive competencies among the determinants of success in life is widely recognized (OECD, ESP, 2015), hence the need to nurture them from early childhood. Among positive long-term outcomes of such competencies, researchers include the capacity of individuals to participate in society and in the labor market; lower crime rates and less involvement in activities impairing health (Heckman 2008; 2013) and this is especially true for individuals coming

from disadvantaged backgrounds (World Bank, 2011; Heckman, 2013; European Commission, 2011; EC, EACEA, Eurydice, Eurostat, 2014). However, wide debate exists worldwide on the concepts to be measured and especially on the definition of their components.

What is Developmental Learning to Learn? What is the relation between non-cognitive and cognitive competencies with Learning to learn development? How can we measure Learning to learn development in preschool children? This article seeks to address these three questions with the following argumentation.

In the first paragraph, the notion of learning to learn is introduced, defined and discussed with its lifetime functions. Its role as a connecting competence between cognitive and non-cognitive ones is also supported, and a working model on how Learning to learn unfolds is presented.

In paragraph two, developmental antecedents of this notion are traced in the relevant literature along with their components. Links to the European framework on Key Competencies and on Quality in ECEC and to Italian curricular guidelines are provided. The synthesis of this paragraph is a set of components of Learning Potential that could form the basis for the development of the measurement toolkit for use in Italian preschools.

Given the complexity examined, the third paragraph will introduce potential methods to measure the notion in preschool children, starting from a review of current testing options. One of these methods, a check list for teachers and parents, will be introduced and discussed.

Conclusions include potential assessment strategies further guiding tool development.

Learning to learn and its conceptual space between cognitive and non cognitive competencies

Broadly speaking, cognitive competencies are those connected with intelligence and the acquisition of knowledge (i.e., verbal, reasoning, logical and visuo-spatial abilities, processing speed) and are generally indexed by students' results in competence tests in mother tongue, maths and problem-solving (Demetriou, 2014; OECD ESP, 2015). Cognitive competencies, in the traditional path stemming from Piagetian theory, are acquired progressively at certain stages of development.

Non-cognitive competencies are a broad family of skills involved in social interactions, goal-directed behavior and managing emotions (OECD ESP, 2015; Blair, 2002). They include motivation, engagement, effort and emotion self-regulation, the ability to tolerate frustration and to get along well with peers, to name but a few components. In the Vygotskian tradition, the markedly social origin of both cognitive and non-cognitive competencies is emphasized, together with scaffolding strategies for their development.

Cognitive and non-cognitive competencies are clearly different constructs contributing to the development of balanced personalities, they moderately correlate and measures of their components show that they are distinct yet interrelated. Blair (2002) maintains that emotional development in early childhood can influence the development of certain areas connected with cognition in the brain. This is because children's brain structures associated with emotions are more developed than those associated with cognition.

The link between the two sets of competencies lies in the development of higher-order self-regulation of emotions and cognition, in meta-representation and metacognition, and in what many authors term as executive function (EF). Relatively wide consensus exists on the identification of components of this latter notion, however defined: EF comprises working memory, attention, action monitoring and inhibitory control (Zelazo, 2003; Carlson, 2009; Rao et al., 2014).

Shonkoff & Phillips sustain that "the growth of self-regulation is a cornerstone of early childhood development that cuts across all domains of behavior" (Shonkoff & Phillips, 2000, p. 3).

Twelve years later, in the update of *From Neurons to Neighborhoods*, Stipek confirms that executive functions (EFs) are important for social skills as well as learning and that EFs include both cognitive and emotional skills and attributes. (Stipek, 2012, pp. 21-22). Blair (2002, p. 299) maintains that self-regulated learning has its foundation in metacognitive abilities, also referred to as self-regulation abilities or executive function (EF). EF includes memory, attention and inhibitory control and it develops along with the prefrontal cortex, approximately from the age of three up to children's school starting age. Only moderately correlated with intelligence, EF (for some authors Learning to learn) seems to be a stand-alone function of the brain affecting intelligence and scholastic adaptation,

and adaptation to societal demands later on. EF in this contribution is seen as a central yet not the sole component of the notion of Learning to learn.

Listed among the eight European key competencies (EU Communities, 2006), Learning to learn is a complex concept which has recently re-attracted the interest of researchers worldwide (Deakin Crick et al., 2014). In that volume, I proposed a working model of Learning to learn in adults (Stringher, 2014). Within that model, a broad Learning to learn definition could be the connecting ring between cognitive and non-cognitive competencies, with a special attention to its developmental aspects: “Executive process of control of learning, conceivable as a disposition to engage deeply in learning, which bestows individuals with increasingly higher command over modes, time and spaces of their own learning. Such a process evolves in a developmental and lifelong trajectory, with the ultimate goal of making sense of reality”. (Stringher, 2014, p. 22).

In this definition, Learning to learn is conceived of as an executive function managing learning and orchestrating individual resources (its components) for learning and reflection upon learning in a constant search for meaning. In the same text I also refer to both individual level components (cognitive, affective-motivational and metacognitive components combined) and to the social-cultural and temporal dimension of learning and of learning to learn, since this process does not happen in a vacuum and it is widely influenced by the bio-ecology of variables within a given system (Bronfenbrenner & Morris, 2007). In addition, I propose a working model of how Learning to learn is triggered by biological intrinsic needs (Deci & Ryan, 2002) and environmental demands. Furthermore, I clarify the difference between learning products attained during learning (knowledge of facts and skills acquisition), the learning knowledge with a repertoire of strategies one can develop through reflection and metacognition on own learning actions and products, and the growing complexity of social Learning to learn between individuals and in groups, in a lifelong trajectory and within several life-wide contexts. Learning to learn is thus both a process and a method for enhancing learning and a product of higher-order learning when it produces knowledge upon one’s own learning.

Concerning Learning to learn components, the list is very long and possibly not univocal, yet it constitutes the most comprehensive I have come across until now: I have counted 46 macro-components or factors

grouped into two domains: the personal and the social, each with its own dimensions. In the social domain I include a quite complex competence such as understanding the learning environment (with its often implicit rules), together with social values, interpersonal relations, learning with peers and in groups, perception of support from significant others and broader environmental resources for learning. In the personal domain I include inherited assets (such as intelligence, aptitudes and the innate desire to learn); the cognitive dimension (including knowledge and the 3 Rs, learning goals and styles, problem-solving and practical thinking among others); the metacognitive dimension (comprising knowledge upon own learning, control strategies, self-appraisal and self-awareness); the affective-motivational dimension (with key components such as learning motivation, perseverant effort, attitudes towards learning, affective self-management as a learner; personal beliefs); the dispositional dimension (where meaning making is central, together with curiosity, creativity and resilience in learning). The proactive dimension (of learners acting/interacting upon and with their own learning) and the developmental dimension (connected with learners' time, age and stages of development) are transversal to the personal and social domains.

Learning to learn thus seems to have a core nucleus in its biological determinants (neural maturation and differentiation besides physiological needs according to Maslow's theory), together with its psychological determinants (basic psychological needs according to Deci and Ryan) and its social determinants (values and beliefs in particular). These determinants have in common the key element of the innate desire to learn typical of the human species, which enables individuals to confer meaning to reality and to adapt to the environment. Yet, Learning to learn is not just learning¹, but learning of higher order, thus it needs also self-evaluation, self-reflection and self-regulation to be fully developed. It is useful to annotate what Learning to learn is not: not only metacognition, but also affective, and biological dimensions contribute to it; not just school-related skills, but also lifelong and lifewide learning skills; not just study strategies, learning strategies or cognitive styles (in the cognitive dimension); not only Self-Regulated Learning (SRL), but also social aspects of learning are involved; not just cognitive problem-solving, but a

¹ Confusion still remains between learning and Learning to learn also in the terminology found in scientific literature.

reflective methodology useful to evaluate solutions also in affective-motivational and experiential learning domains (Stringher, 2014, p. 24).

The two main functions of Learning to learn are: learners' improvement/empowerment, autonomy, adaptability (a guide of concrete learning, an optimization and regulation of learning processes; youth development; adaptation to working and domestic life up to the creation of a balanced personality; search and development of (self-) meaning); social functioning and well-being of cooperative individuals and society at large. Hence, its importance for youth development, for the development of "a nation of good learners" in Hautamäki's and colleagues' terms (2002), or for the development of what Montessori referred to as a nation of better humans, of observers and researchers needed for a rapidly changing world (Montessori, 1948/1999, pp. 33, 43).

If this is the end-state of adult Learning to learn, its development in early childhood has to do with the building blocks of such a complex brain function. This is what I will attempt to describe in the following paragraph.

Developmental Learning to learn constituents

According to the previously presented model of Learning to learn functioning in adults, the process is triggered by the innate desire to learn. Newly-born children possess an innate desire to learn, which is functional to their development. In this sense, they are already equipped and "ready" to learn (Bingham & Whitebread, 2012; Deci & Ryan, 2000; Montessori, 1999, 2000), although they not ready for Learning to learn yet like I will explain later in this paragraph. In addition to the desire to learn and to biological needs for nutrition and care, children manifest basic psychological needs for autonomy, relatedness and competence (Deci & Ryan, 2002; Janus et al., 2007). Such basic needs are also confronting children with their contexts, tuning them with their environment (Demetriou, 2014). The core drivers of learning to learn from early childhood onward are thus biological and intrinsic needs together with environmental demands. These drivers activate socio-affective, motivational, cognitive and mental assets contributing to learning actions of the individual in search for meaning (Stringher, 2014) and for patterns of occurrence in the phenomena of their surrounding world. At birth, however,

brain architectures do not seem fully developed to enable conscious awareness and executive control of these functions: especially the prefrontal cortex dedicated to higher order processing is evolving from birth (Center on the Developing Child at Harvard University, 2011). According to Montessori, children start reflecting very early on their learning activities by detecting similarities, differences and patterns in the objects they observe or manipulate: Demetriou (2014) maintains that inductive inference based upon perceptual similarity is probably present at birth. Parallel with cognitive and EF development, children expand their social world with their own Theory of Mind and start reflecting on other's thoughts and feelings and on their own at as early as three years of age (Saracho, 2014). They develop an understanding that people act on the basis of their mental states and those inferred in others, such as beliefs, desires, emotions and intentions. In this way children's developmental Learning to learn (also referred to as Approaches to learning in this context) seems to develop quite rapidly during the early years and is inextricably dependent from children's environmental stimuli, offered primarily within their home and in ECEC settings. The period between 3 to 5 years of age seems crucial in this evolution.

Developmental learning to learn at this stage can also be termed learning potential, since not all Learning to learn components are present and developed (such as language or the 3Rs of Reading, wRiting and aRithmetic). Such development is a function of neural differentiation and interconnections (Center on the Developing Child at Harvard University, 2011). Maturation levels of neural networks dedicated to task switching, for instance, may limit young children's full functioning in these tasks (Huizinga & Van der Molen, 2011). How all its building blocks evolve into full Learning to learn competence is largely unknown: studies in the developmental research perspective have generally followed a few of those considered key, such as the basics of Executive Function (working memory, attention, inhibitory control, flexibility), but not all Learning to learn components and not all the stages which could be hypothesized. EF is in itself a concept with multiple acceptations: from an orientation to the achievement of specific goals (Blaye & Chevalier, 2011), up to the orchestration of several types of executive functions (Center on the Developing Child at Harvard University, 2011). At as early as 3 years of age, EF is thought to emerge as a unitary domain-general construct (Wiebe

et al., 2011), while it becomes more focal and domain-specific at later stages (McAuley and White, 2011). Other components of EF such as goal representation and sustained attention, seem to also increase their predictive power on EF tasks performance with age (Blaye & Chevalier, 2011; Reck & Hund, 2011).

Connections between the various Learning to learn components at preschool age is largely unknown too. EF and social cognition is one of those connections supporting the previously introduced Learning to learn model, where the social domain has been considered as a key defining element. EF seems to be implicated in comprehension of others' beliefs and false beliefs (Henning et al., 2011; Dryton et al., 2011) and enhanced by social competition (Qu, 2011). Social cooperation is instead emphasized in oriental conceptions of early Learning to learn (Ren, 2014; Rao et al., 2014), thus it seems that also Learning to learn is susceptible to social and cultural influences. Other links of EF with the social domain have been experimentally studied taking into consideration language development, an intrinsically social activity. There is evidence of enhanced EF already in bilingual toddlers and language is thought to affect EF from toddlerhood also in monolingual children, pointing to the importance of representation in EF development (Poulin-Doboise et al., 2011; Miller & Marcovitch, 2011). Hot and cool EF, in motivationally and emotionally charged situations or in neutral contexts respectively, is another example of the interaction between the cognitive and the non-cognitive domains of Learning to learn (Carlson, 2009; Welsh & Peterson, 2014). Zelazo and Carlson (2012) have found that both types of EF are malleable and thus teachable.

EF are the foundations of further learning, a foundation of child development and of the ability of children to benefit from schooling (i.e. school readiness, Blair, 2002; Linder et al., 2013), a concept that is regrettably yet frequently referred to as readiness for school and lifelong learning, with lifelong learning often being neglected. Especially in the Anglo-Saxon literature it seems school readiness is prominent over and above development. According to the Center on the Developing Child at Harvard University (2011), EF is distinct yet functional to school readiness and academic success, being the biological basis of school readiness for some authors. I would argue on the biological nature of EF, as it may develop or it may be thwarted by a favorable or unfavorable social milieu,

but I want to especially underline that too much emphasis is placed on school success as immediate outcome of EF. Such emphasis is pernicious and it may confuse the means with the end: what we need to nurture and not thwart is children's innate desire to learn and keep learning lifelong. Schooling, no matter its importance, is a mean to an end, i.e., the well-being and social adjustment of individuals in society, thus it cannot be focused on short-term goals of higher marks and higher scores on tests². Tests and marks are important to the extent that they are informative of the current state of a learning process, yet education sociologists and scholars studying learning motivation warn against consequential validity of these measures, risking to label a child indelibly (Natriello, 1996; Harlen & Deakin Crick, 2002) and this is especially true in early childhood. Schooling must serve the scope of forging minds that learn (Wells & Claxton, 2002). This means that the practical side of training children for EF development should be handled with this purpose in mind, no matter how difficult this task is for teachers, in order to avoid reducing this key ingredient of Learning to learn to low-profile drill exercises. At this point, I provide a definition of Developmental Learning to learn (or Learning potential or Approaches to learning):

Holistic capacity to learn which sets the basis for lifelong learning and mediates future learning attainment and achievement. This capacity is gradually built during the first years of life by the interaction of children's genetic endowment (determining their cerebral maturation level) and their immediate social environment (family and ECEC services in particular). This learning potential is composed of abilities, knowledge and behaviors. Among them, cognitive and metacognitive, socio-affective-motivational mental assets.

Three questions seem relevant for measurement of (developmental) Learning to learn: a) to hypothesize how it operates in individuals; b) to operationalize and further deconstruct the notions of socio-affective,

² In this context it is not possible to articulate this argument further, but plenty of literature on learning motivation would suggest to avoid at least placing too much emphasis on the value of marks (Harlen & Deakin Crick, 2002): they are not the core, the core is learning, possibly guided by intrinsic motivation (Deci & Ryan, 2002).

motivational, cognitive and mental assets, c) with a special attention to how young children solve learning problems in action. A hypothesis on the functioning of Learning to learn seems key, because simple lists of components to be measured could be very difficult to interpret empirically.

The first starting point (how Learning to learn operates in individuals) has been described in the previous paragraph; the second point is addressed here with a list of components, while the third concerning measurement issues will be considered in the third paragraph of this contribution. Within the Italian framework for the assessment of child development and Learning to learn at the end of preschool I have attempted to clarify the notions of socio-affective, motivational, cognitive and mental assets. Again, a precious source is Demetriou's work on the developing mind (2014). Of particular interest within this context is his attempt to enucleate a series of components of Learning to learn which could constitute the basis for early assessment of this competence in its developmental flow. Among such components, the author explicitly mentions: knowledge of own mind; self-monitoring, self-representation, and self-regulation skills; awareness of own cognitive strengths and weakness in certain knowledge domains; asking for help; monitoring and regulation of representational capacity; inferential schemes. This could well be a first list of what I have previously referred to as mental assets of the cognitive and metacognitive (or hypercognition in Demetriou's own words) domain.

Socio-affective and motivational assets should also be identified. An analysis of psychology literature on child development and on school readiness for learning (with relevant constructs and assessment tools) yielded to Table 1, organized by developmental domain. The table also contains corresponding Italian curricular guidelines with expected child outcomes per domain at the end of preschool (MIUR, 2012). The Italian curriculum includes the broad domains of development also considered in the recent European Quality Framework for ECEC (EU, 2014). The theoretical difficulty here lies in the definition of precise borders to consider between each developmental domain, and this difficulty is particularly sharp for Learning to learn, according to the discussion above concerning the overlap of cognitive and non-cognitive competencies.

Table 1. Learning to learn developmental domains and factors to be assessed confronted with child outcomes of the Italian curricular guidelines

<i>Developmental domain</i>	<i>Developmental Factors</i>	<i>Child outcomes according to ECEC Italian curricular guidelines</i>
<i>Cognitive, perceptual and logical-mathematical abilities</i>	Visuo-spatial ability ³ ; concept of inclusion and object classification, objects seriation and ranking; temporal concepts ⁴ ; number sense, number knowledge and enumeration, sense of quantity and subitization ⁵ ; biunivocal correspondence; attention and parallel processing ⁶ ; differences and analogies detection; short-term memory; problem-solving; reasoning; cause-effect; geometrical forms recognition.	Child demonstrates initial logical abilities, starts to interiorize space-temporal coordinates and to grasp symbolic representations; starts grasping media and technology. Detects main characteristics of events, objects, situations; formulates hypotheses; researches solutions to everyday life situations.
<i>Learning to learn (EF with cognitive and metacognitive self-regulation and socio-emotional-affective self-regulation)</i>	Selective and prolonged attention during work/task performance and engagement in task; autonomy and initiative; self-knowledge and knowledge of own mind, self-representation and self-awareness; awareness of own cognitive strengths and weakness in certain knowledge domains; cognitive self-regulation and inhibitory control, monitoring of own mental processes and regulation of representational capacity; reflection on own learning or on own mistakes; inferential schemes; emotional recognition and expression, emotional self-regulation, deferred gratification and aggressiveness; self-confidence; Theory of Mind and understanding of others' thoughts, perspective-taking; empathy; cooperation; relationships with adults and with peers; problem-solving in interpersonal relations; creativity and inventiveness, imagination; curiosity; rule observation (socially and cognitively), flexibility and task shifting vs perseverance in fixed rules; effort, perseverance as concentration and persistence on task and motivation, resilience during difficulty and asking for help if and when necessary; interpretation of phenomena and of own deeds; leadership.	Recognizes and expresses own emotions, is aware of desires and fears, feels own and others' feelings. Shows curiosity and will to experiment, interacts with objects, environment and people, perceiving their reactions and changes. Shares experiences and play, uses materials and common resources, gradually faces conflicts and started to recognize behavioral rules in private and public contexts. Has developed a questioning attitude and to ask questions on meaning of ethical and moral matters. Understands others' points of view, reflects and negotiates meanings, uses errors as a source of knowledge. Carefully listens to task instructions, is passionate, finishes work, becomes aware of processes and can document them.
<i>Linguistic ability (pre-literacy, reading and writing)</i>	Oral text comprehension (instructions, logical-temporal relationships, denomination, phrasal production, linguistic functions); knowledge of the alphabet; phonological awareness (phoneme and syllable discrimination, double consonant, phonological similarities, reproduction or articulation difficulties); symbolization (symbol recognition, linguistic and mathematical symbolization).	Know how to tell stories, narrate, describe situations and lived experiences, communicates and expresses one-self with a plurality of languages, uses Italian language with increasing proficiency. Expresses one-self in a personal manner, with creativity and participation, is sensitive to a plurality of cultures, languages, experiences.
<i>Psycho-motor development and general wellbeing</i>	Autonomy with body functions (washing, dressing, going to the bathroom) ; general coordination; ocular-manual coordination; sense of balance; hygiene; lateralization; praxiae, body scheme.	Has a positive relationship with own body corporeity, matured a sufficient self-confidence, is progressively aware of own resources and limits, when needed know how to ask for help.
<i>General knowledge</i>	On civic society, nature, science.	Elaborates the first "physical organization" of the external world through concrete activities directing their attention to the diverse aspects of reality (...) Carefully observes own body, living organisms and their environments, natural phenomena, realizing their changes. Is interested in machinery and technological tools, knows how to discover their functions and possible uses.

³ Including recognition of right-left, over-under, inside-outside, big-small.

⁴ Before-after, yesterday-today-tomorrow.

⁵ Subitization is the capacity of the child to grasp quantity without counting a set of up to 4 objects. This seems possible thanks to a representational system of quantity which seems to be innate (Kroesbergen et al, 2009).

⁶ Such an ability is often measured with the so-called Stroop Effect test, i.e., exposing the child to two series of colored words: in the first series words correspond to the uttered color word, while in the second series colors do not correspond with the uttered color words. Attention deficits often associated with this task seem caused by the necessity to process information on the written word in parallel with the color to be distinguished. (MacLeod, 1991).

However, this might not be a too tight constraint in the empirical phase of an assessment: what is important in any assessment tool is to produce a set of propositions and tasks allowing to collect data on a sample of *all* factors and variables contributing to define a concept, so to enable robust statistical analyses afterwards.

This is why, for the moment, Learning to learn constituting elements are arbitrarily included in the set of socio-emotional-affective domain, in spite of its transversal coverage of both cognitive and non cognitive competencies. It must be underlined that the cognitive domain in Table 1 might contain components of Learning to learn which are not duplicated in the other domains.

Measuring Developmental Learning to learn (Learning potential, Approaches to learning)

The complexity of Learning to learn in adulthood and childhood is evident from the reconstruction of their definitions and contents exposed in the previous paragraphs. Yet, the core difficulty lies in its assessment.

To date, although in early childhood there are no attempts to assess this concept in its entirety⁷, especially with performance assessments, research on Self-Regulated Learning and Executive Functions reviewed above does use several tasks and other tools to measure specific components of what I have previously referred to as Learning potential. Before I address assessment in early childhood, I will briefly report on the difficulties in measuring Learning to learn in student populations and in adults.

Three exemplar research projects can provide useful experiences in this respect: the European Pre-Pilot Project on Learning to learn (Hoskins & Fredrickson, 2008; Kupiainen, Hautamäki & Rantanen, 2008); the Effective Lifelong Learning Inventory (ELLI Project, Deakin Crick, Broadfoot, Claxton, 2004); and the Learning to Learn Project of the University of Helsinki (Hautamäki et al., 2002). To describe each project in detail is

⁷ An example of a limited conception of Approaches to Learning is the scale developed within the US Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K): approaches to learning are a 6 items subset of the wider Social Rating Scale (SRS). For further information, see the National Center for Education Statistics (NCES) website: http://nces.ed.gov/pubs2010/data/2010070_atl_readme.pdf.

beyond the scope of this paper, yet it is useful to recall that the Finnish project dealt with a more cognitive and task-oriented view of Learning to learn assessment, while the British was centered on affective-motivational aspects of learning to learn to be captured via self-reported behaviors and attitudes towards own learning power. The European Pre-Pilot Project aimed at incorporating also a Spanish metacognitive module (Moreno, & Martín, 2007) and included both assessment techniques: a relevant part was based upon tasks tapping especially into students' knowledge of the scientific method and of problem-solving, while metacognitive questions on the tasks were asked to students after task completion and a third affective-motivational part incorporated attitudes and behaviors from the British checklist, revised for inclusion of additional items. The test dimensions are synthesized in Table 2.

Table 2. EU pre-pilot test dimensions

The cognitive dimension

- Identifying a proposition
- Using rules
- Testing rules and propositions
- Using mental tools

The affective dimension

- Learning motivation, learning strategies and orientation toward change
- Academic self-concept and self-esteem
- Learning environment

The metacognitive dimension

- A metacognitive monitoring task
 - Metacognitive accuracy
 - Metacognitive confidence
-

Current methods for measuring Learning to learn competencies fall into two main categories: a) self-reports and check-lists; b) performance assessments and PISA-like tests⁸. Issues with these solutions are connected with the very type of methods used: on the one hand, self-reports and check-lists miss out on actual performance and might be biased by respondents' compliancy; on the other, performance tests miss important personal characteristics, such as information on the learner's own

⁸ In this context, it is worth noticing that OECD PISA 2009 does have a built-in Learning to learn component, yet such component seems to have little resemblance with the wide Learning to Learn conception that has been considered in this contribution: it is rather confined to a few study strategies only (see Appendix 2 for the methodology used to assess students' learning strategies in PISA 2009).

perception and behavior as a learner. One consideration concerning the aim of the assessment is also very useful in orienting methodological decisions: according to EU Pre-Pilot study, Cronbach's Alpha for scales' internal consistency is approx 50% higher in the self-report (affective) part of the test (Kupiainen et al., 2008). This could suggest the use of self-reports for low-stakes empowerment interventions, as self-reports seem a promising tool in terms of construct validity. The open question is on measurement of Learning to learn for high stakes decisions, such as those pertaining to retention in Italian preschool when a child is deemed not ready for primary education. In case of high stakes, it seems more advisable to also have measures of performance of the individual child in Learning to learn⁹. However, a performance test that is assembled from other different tests may not be optimal. As Kupiainen and colleagues maintain, a "test, based on a common European framework but adopting tasks from tests rising from different theoretical backgrounds and conceptualisations of learning to learn, has lead to an instrument marked by the paradigmatic differences between these earlier endeavours". (Kupiainen et al., 2008, p. 4).

This is not an issue to be solved quite easily without researchers' agreement on a common research paradigm, yet Learning to learn has been an area of study where the Lifelong learning and Developmental Psychology paradigms have contributed with at least two very different approaches, such as the (neuro)cognitive and metacognitive in addition to the socio-cultural-historical approach (Stringher, 2014). Fundamentally, at least two visions have been contrasting in this field, the Vygotskian and Piagetian traditions, while up to now the sociology of Learning to learn has been far less prominent. It is not surprising that a complex concept such as Learning to learn has not been defined and researched with multidisciplinary lenses yet.

This is why, within the Italian exploratory study on child outcomes assessment at the end of preschool (the INVALSI VIPS Project) a new check-list has been developed for children's empowerment interventions.

⁹ Yet, these decisions should not only rest on tests, but rather be founded on sound knowledge of the child and of his or her background and home learning environment. It does not seem fair to just retain a child that has not been exposed to enhancing experiences, but this decision is often out of the reach of scientific assessment offering a "diagnosis" at best: the "cure" should be decided with care not in a punitive or restricting way, it should rather be connected to better learning opportunities for the child that is deemed to be not ready for school.

Its primary scope is to scientifically elaborate the concept of Developmental Learning to learn within the Italian context, with potential extension of scale use in other cultures as well. Its concrete purpose is not to rank and compare children based on another test which is not fruitful for them, but it is an aid for teachers (and potentially also for parents) in their observation of developing Approaches to learning in 5 or 6-year-old children attending the last year of preschool or the first year of primary education. The check-list, named Approaches to Learning Assessment Scale (*ALAS*, i.e., wings in Spanish), consists of 33 statements describing different attitudes and behaviors related to children's approaches to learning¹⁰. The scale is unique in that it assesses this concept as a standalone notion, not as part of the notion of school readiness or even of EF.

The compilation of the check-list requires that a teacher observes the child's behavior for a few days and indicates the degree of ability of the child on each of the statements. The scale is developed on three levels: 1 = Not yet competent, the child has not yet shown a certain behavior; 2 = Developing competence, the child occasionally showed a certain behavior; 3 = Developed competence, the child always or often shows a certain behavior. There is the possibility for the respondent to also assign 0 = I do not know, I have not observed if the child shows a certain behavior.

Scale construction has been following the steps foreseen by the American Psychological Association's Standards for Educational and Psychological Testing (1999), yet it has only begun to undergo validation procedures¹¹. Issues of construct underrepresentation and construct-irrelevant variance are and will be addressed. The first type of issue has been addressed by the construct analysis carried out prior to check-list development (partially reported here in Par. 2) and has been further explored through focus groups with the different intended informants and

¹⁰ See Appendix 1 for the initial items translation into English.

¹¹ In order to validate the questionnaire the following propositions will be investigated: higher scores correlate moderately with individual's intelligence as measured with Raven Progressive Matrices; lower scores are correlated with poor results in other competences, such as literacy and numeracy in primary school; lower scores are correlated with lower school marks in primary school; concurrent validity of *ALAS* compared with other check lists of the same kind, specifically developed to assess aspects of Developmental Learning to learn, such as the Preschool Learning Behavior Scale (*PLBS*, Mc Dermott et al., 2002), yet of foreign origin.

foreseen scale users (i.e., preschool teachers and parents and primary school teachers and parents)¹² and with the parallel matching of Italian preschool curricular guidelines. Although this is not properly a standards based measure, it can be said that stakeholders voices have been taken into consideration in its construction.

Construct-irrelevant variance is a far more pernicious issue in Learning to learn testing, for the construct's own interactions with cognitive aspects of human personality. The aid of experts in the fields of intelligence testing has been considered to reduce the risk of going out of the range of the construct, yet this latter check has not been performed yet.

Test format, administration conditions and language levels have been already monitored with the first pre-pilot administration and will again be monitored through test administration observation sheets during the statistical evaluation phase.

One aspect that is particularly relevant with young children's tests is consequential validity and the use of data collected for a specific purpose. To this end, in order to avoid improper use, a guideline document for teachers is under development informing them of the purposes and limitations of scale deployment in classrooms. After they compile the check-list for each child or for a classroom, teachers have two options: they may offer each child with insecure competency additional experiences in the areas identified through scale administration, or they can group children with similar insecure competency patterns and work as a group on enhancing experiences and opportunities to learn how to learn better.

The checklist is a useful complement to the evidence of other tests on

¹² It is beyond the scope here to report on all the steps of this study, but the focus groups held in different parts of Northern, Central and Southern Italy confirmed the very fuzzy notion of school readiness and attached meanings that teachers and parents have. This should induce to handle school readiness with extreme care, and the road in Italy is to assess developmental milestones, rather than a shorter-term goal such as school readiness. During a pre-pilot administration of the ALAS, a very high Cronbach's Alpha has been found: .95 for the scale developed for teachers and .83 for the parental version (38 and 41 cases respectively). The lower Alpha in the parental version seems connected to difficulties in the wording of some items, too skewed towards school environment. In spite of these easily amendable shortcomings, validation on a wider representative sample needs to support this quite good result, which is encouraging further research on this concept as assessed by the rating scale.

school and learning readiness¹³, in order to identify which specific skills can aid a child for primary school and for lifelong learning beyond school years, with a focus on development rather than on schoolification. This attempt on the assessment of Developmental Learning to learn is only a part of a wider attempt to elaborate a set of tools to accurately measure this concept in early childhood. The core challenge will be to build a new performance assessment with a set of tasks mobilizing Learning to learn in preschool children, exposing them to novel age-appropriate learning situations they can try and solve during task administration and/or afterwards, with their teachers and peers¹⁴.

This challenge is quite new and daunting, given the extent of developmental Learning to learn, the number of components to be assessed and the complex interactions among them. Just as an example of the difficulties to be overcome, basics of EF such as attention, could be measured with existing tools, but what exactly do tasks measure is an entirely different question which will be very relevant in future performance tasks construction. A promising road for the assessment and for the comprehension of how Developmental Learning to learn evolves in young children is characterized by a wide conception and by the focus on child development (development of Learning to learn within the broader developmental domains and correlates) rather than only on school readiness. Of course, assessment is notoriously parsimonious, and to reduce all this complexity without losing it “in the translation” is what remains to be solved.

¹³ In the VIPS project, the School Readiness 5 revised edition was used (Zanetti & Cavioni, 2014).

¹⁴ According to a recent contribution (Barbu et al., 2015), there seem to be no performance assessments for a wide conception of Approaches to learning in the reviewed literature, while check-lists have been developed either from already existing instruments, or from existing State standards in the U.S. Tests tapping single components of Developmental Learning to learn and EF should also be examined, such as the Head, Toes, Knees Shoulders (HTKS, McClelland et al., 2014) or the Dimensional Change Card Sort (see Zelazo et al., 2003). An interesting perspective is offered by a check-list meant to orient teacher observation of metacognition and SRL in young children (Whitebread et al., 2009).

Conclusions and way forward

Learning to learn is a complex competence orchestrating cognitive, metacognitive and socio-affective-motivational assets of the individual in an effort to produce knowledge upon own learning and learning improvement, if the individual chooses so. It has a core component in Executive Functions, yet it does not coincide with this latter notion, since social components, yet to be fully explored, contribute to Learning to learn from early childhood onwards. Learning to learn is key for youth development, lifelong learning, social adjustment and wellbeing in adult life.

This competence develops in children with trajectories that are starting to be revealed by developmental research in the (neuro)cognitive tradition, concentrating primarily on EF components, such as working memory, mental flexibility (focusing or shifting attention), inhibitory control and monitoring of own learning actions. Social-emotional development shows parallel activity in early childhood, language development being a vital medium of social interaction, and rapidly contributes to Developmental learning to learn.

The need to assess Developmental Learning to learn from early childhood is important especially to enable preschool teachers aid children in difficulty. Children from socially disadvantaged backgrounds may benefit most from interventions geared to expose them to learning opportunities enhancing their Developmental Learning to learn. This is why formative assessment seems crucial in this endeavor. The present article is an attempt to precisely define Learning to learn in adults and in early childhood, so to enucleate components that are relevant for the development of assessment tools. A check-list conceived within the Italian VIPS study on school readiness has been presented and commented. The scale is unique in that it assesses this concept as a standalone notion, not as part of the notion of school readiness or even of EF.

Psychometric validation of the scale has been discussed as part of a wider project on the creation of a set of tools measuring Developmental Learning to learn in early childhood, including performance assessment tasks. One tool cannot account for the complexity of this notion even in preschool children. This is why an assessment strategy including multiple tools for different informants could be pursued.

Such an endeavor is quite complex, given the nature and breadth of Developmental Learning to learn, almost coinciding with the multiple facets of development itself. However, if an assessment comprising a set of tools to measure different domains and aspects of this concept is conceived, the study of Developmental Learning to learn is deepened and the capacity to learn is again at the center of the attention of researchers, practitioners and policy makers in the area of early childhood education. To avoid thwarting children's innate learning ability and their curiosity for their world.

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Appendix 1. Approaches to Learning Assessment Scale (ALAS)

Items:

1. Tries to perform new tasks even though he/she knows that might make mistakes
2. Perseveres in an activity until it is finished
3. Is proud when he/she can finish a task
4. Is motivated if encouraged to carry out an activity
5. Knows how to finish a task independently
6. Experiments new games with enthusiasm
7. Is able to concentrate on what needs to be done
8. Shows interest and asks questions about the objects observed in the environment
9. Recognizes and corrects own mistakes under the supervision of an adult
10. Researches the causes and effects of events related to his personal life
11. Experiments new games or toys with enthusiasm, also by trial and error
12. Begins to manifest self confidence as a person with growing abilities
13. Follows classroom rules and routines
14. Uses the materials at own disposal respectfully and clearly oriented to a purpose
15. Shows curiosity and desire to learn
16. Chooses freely whether to focus on a new task or engage in activities already known
17. Uses tools for investigation and research (eg.: a microscope, a lens, a series of boxes/bins of different sizes ...)
18. Compares objects or phenomena observed at two different times
19. Actively seeks answers to questions through exploration
20. Expresses surprise and asks questions about the world and nature
21. Is able to easily memorize more than 3 different words and repeat them in the same order
22. Listens carefully to the explanations in classroom
23. Repeats an activity until is able to master it alone
24. Checks own work alone (eg.: if a task is completed, if a task has been performed well, auto-correction of the error, etc.)
25. Uses the error as a source of knowledge and improvement
26. Is flexible and succeeds in switching from one task based on a rule to a similar task, but with different rule (eg.: classification of objects first by color and then by shape)
27. Is flexible and able to see the same problem from two different perspectives / angles / points of view
28. It is able to delay gratification after a well done action/task
29. Is able to defer the satisfaction of a need (eg.: eat a cake that is at hand)
30. Is able to plan a series of steps to reach the solution of a problem or the desired result
31. Shows a sense of self-discipline in the classroom
32. Makes assumptions about how own mind operates
33. Shows commitment to enhance own learning

Scale:

- 1 = Not yet competent = the child has not yet shown a certain behavior
 2 = Developing competence the child occasionally showed a certain behavior
 3 = Developed competence the child always or often shows a certain behavior
 0 = I do not know, I have not observed if the child shows a certain behavior.

Appendix 2. How PISA 2009 assesses students' use of learning strategies

MEMORISATION STRATEGIES

Memorization strategies refer to the memorisation of texts and contents in all their details and repeated reading.

Item of the index of memorisation strategies:

- When I study, I try to memorise everything that is covered in the text
 - When I study, I try to memorise as many details as possible
 - When I study, I read the text so many times that I can recite it
 - When I study, I read the text over and over again
-

ELABORATION STRATEGIES

Elaboration strategies refer to the transfer of new information to prior knowledge, out-of-school context and personal experiences.

Items of the index of elaboration strategies:

- When I study, I try to relate new information to prior knowledge acquired in other subjects
 - When I study, I figure out how the information might be useful outside school
 - When I study, I try to understand the material better by relating it to my own experiences
 - When I study, I figure out how the text information fits in with what happens in real life
-

CONTROL STRATEGIES

Control strategies mean to formulate control questions about the purpose of a task or a text and its main concepts. It also means to self-supervise current study activities, particularly whether the reading material was understood.

Items of the index of control strategies:

- When I study, I start by figuring out what exactly I need to learn
 - When I study, I check if I understand what I have read
 - When I study, I try to figure out which concepts I still haven't really understood
 - When I study, I make sure that I remember the most important points in the text
 - When I study and I don't understand something, I look for additional information to clarify this
-

Source: PISA 2010, p. 48.