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At the boundary of school: Continuity and discontinuity in learning across contexts

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ABSTRACT

In response to various societal changes, schools are increasingly developing an outward orientation, seeking to connect to students' out-of-school participations. Simultaneously, educational research is starting to adopt a multisystemic approach to learning. Focusing on continuity and discontinuity in students' learning across school and out-of-school contexts, we synthesize 186 empirical studies. After conceptualizing school and out-of-school in relation to each other, we find that continuity can be the result of different educational intentions, but it also occurs as a given. Discontinuity is mainly found for non-mainstream students, with severe implications for students' learning and participation in school. Some studies show how different actors, including students, deliberately seek discontinuity, challenging the widespread preference for continuity. We discuss the (im)possibilities for schools in connecting to students' wider lives and advance the degrees of freedom afforded in school as an underlying condition for establishing continuity.

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1. Introduction

Students do not stop learning upon leaving the school building. Recognition for this once-novel idea stems from a long line of educational research on learning in settings other than school, referred to by terms as informal, authentic, situated, or everyday learning. Studies exploring 'informal' learning often compare and contrast their findings to learning taking place in school. Yet, this comparison is typically made analytically, sketching, for example, how engagement in learning outside school appears rich, compared to the archetypal image that exists of students' lack of motivation and disengagement in schools (cf. Bevan, Bell, Stevens, & Razfar, 2012; Hull & Schultz, 2002).

Although analytical dichotomies and comparisons between formal and informal ways of learning have been a plausible way to categorize and reckon different activities and settings of learning, a disadvantage lies in (over)emphasizing the *context* of learning (cf. Hodkinson & Macleod, 2010). Besides easily leading to a normative impasse about what context is best (Rogoff, 2003), an emphasis on context can reinforce the idea that learning is bounded in a single time and place. It is this assumption that is often argued to be untenable (e.g., Barron, 2006; Tuomi-Gröhn & Engeström, 2003). Students participate in a wide variety of contexts on a daily basis and can be expected to experience and make connections between them – if only because they may pursue their goals and interests over time. Looking at learning as a process potentially moving across contexts is considered more ecologically valid.

For about two decades, several educational scholars have started to adopt multisystemic perspectives in studying learning, cognizant of students' daily participation across the contexts of school, home, work, peer groups, and leisure institutes (see for an overview Akkerman & Bakker, 2011). Multisystemic perspectives have generated new empirical questions about whether and how learning across different contexts takes place and about the extent and ways in which school and other contexts may simultaneously contribute to learning. Such questions can now be recognized in different areas of research, such as research on literacy development (Hull & Schultz, 2001), student engagement (Lawson & Lawson, 2013) and the use of digital technologies (Ludvigsen, Lund, Rasmussen, & Säljö, 2010).

The value of a multisystemic perspective in educational research is that it allows centralization of the process of learning and the person whom it concerns without neglecting how this process is situated within different practices and activities. Such a perspective seems especially relevant in light of several coinciding developments in contemporary societies. For one, we see how students have become more unique in terms of their specific academic, social, and, cultural backgrounds – *who* is learning (the subject) is diversifying (Hermans & Dimaggio, 2007). Second, we see how students embody their own specific contexts of participation and learning in and outside of school – *where* one learns (the sets of social and material environments) is more personal, depending on own interest groups and activities and one's local and global networks (Lankshear & Knobel, 2008; Siemens, 2014). Third, we see how the future aspirations and requirements of individual students become less predictable, depending on changing professions and societies and the qualifications that these bring to the fore – *what* is to be learned (the object) and pathways by which this occurs are more dynamic.

The sketched developments, despite being of a different nature, appear to have a similar consequence; they bring to the attention the individual student, who is socially, culturally, and academically unique and participates in his or her own set of contexts both in and outside of school, and who faces an undecided future. In light of these developments, existing predefined curricula and trajectories in schooling practices may easily appear limited or inflexible. The developments have led to new debates about what schooling is and what it should be (e.g., Biesta, 2010; Robinson, 2011; Roth, 2015). For instance, Biesta (2010) reasons that not only qualification – currently prominent as a result of accountability and standardization movements - but also socialization and subject becoming are central to education. In general, many have started to argue for a fundamental move toward personalization of learning and more adaptive and inclusive forms of education, also by stimulating schools to create partnerships and collaborate with other actors and practices concerned with the education of children and youth (e.g., Cole & Distributive Literacy Consortium, 2006; Herrington & Herrington, 2006; Lauer et al., 2006).

We aim to contribute to the current educational debate with a synthesis of the empirical literature on students' learning across school and out-of-school contexts. We think a synthesis of the emerging literature is indispensable as a body of literature addressing learning across school and out-of-school contexts is clearly emerging, but is still scattered across different research areas and traditions. Studies in abstract addressing the same phenomenon employ different theoretical frameworks, concepts, and research designs and are organized along subject-specific disciplines or levels of education, making it difficult to generalize from findings across typically small-scale studies. Bringing together the various empirical studies allows us to see what is at stake in actual situations of learning across contexts, for students and other actors involved.

In the following section, we theorize learning across contexts. Drawing on boundary crossing literature, we introduce a layered multisystemic perspective to understand students' experiences in learning across school and out-of-school contexts.

1.1. Learning across contexts

Although traditionally focusing on single educational settings, educational research is showing a rapid development towards a multisystemic perspective on learning. Multisystemic perspectives acknowledge that learning can extend fixed time periods and places and, hence, can be triggered and concurrently supported by different contexts of participation in and outside of education (Ludvigsen, Lund, Rasmussen, & Säljö, 2010; Tuomi-Gröhn & Engeström, 2003). Multisystemic perspectives on learning can be traced back to efforts in different theoretical strands in social sciences, expanding the common unit of analysis of a singular individual or collective and a single context of participation. These theoretical strands include

dialogical and sociocultural theories (Valsiner & Van der Veer, 2000; Wertsch, 1991), cultural historical activity theory (Engeström, 1987, 2001; Roth & Lee, 2007), ecological theory of development (Bronfenbrenner, 1979), multisite anthropology (Marcus, 1995; Star, 1989), and social network theories (Granovetter, 1983).

As mentioned, a multisystemic perspective allows centralization of the learner and the process of learning where and whenever it takes place, without neglecting the way this process is continuously situated in and responsive to various contexts. A particularly helpful conceptualization of learning across contexts can be found in literature on boundary crossing (see for a review Akkerman & Bakker, 2011). Informed by the third generation of cultural historical activity theory (Engeström 1987; 2001) and related situated and socio-cultural approaches to learning (Lave & Wenger, 1991; Star, 1989), the literature on boundary crossing shows a multilayered understanding of learning and interaction across contexts. At a systemic level, this literature theorizes contexts as culturally and historically informed, yet continuously (re)created, *practices* or activity systems. Contexts can be identified by considering the distinct purposes of ongoing activities, and the motives of the various people to engage in these activities (Engeström, 2009). A specific context of schooling can be distinguished from a context of leisure activity, because, for instance, the first might have the purpose of educating students for them to become more knowledgeable and skilled, whereas the leisure activity might have the purpose of development of personal interest and immediate enjoyment. Practices and their purposes can typically be recognized by highly specific, local and routinized ways of doing, talking, relating and organizing. For instance, in schools one may find specific climates of student-teacher interactions, specific procedures to assess learning in certain subject matter, or specific dress-codes, all of which can be different from what is common or valued in a leisure or home context. Naturally, simultaneously engaging in such different practices might be consequential for a person, if only in terms of shifting between different ways of positioning (i.e., between the position as student, as a beginner, as a peer, or as a child, Akkerman & Bakker, 2012; Akkerman & van Eijck, 2013). Participating in contexts and any learning resulting from this can be understood as being shaped and mediated by such contextual specifics.[1]

At an individual and process level, however, boundary crossing literature emphasizes and shows how people may collaborate across different practices, or make connections between their own various contexts of participation. For instance, in dual educational programs actors from school and work practices collaborate to educate students, even though the school and work practices may be very different in nature (Akkerman & Bakker, 2012). In turn, students within these programs are challenged to simultaneously participate in a school and work practice, and are expected to link knowledge and experiences in school to what they encounter at work (e.g., Tuomi-Gröhn & Engeström, 2003). It has been argued that individuals have the capacity to make such connections by making sense, translating, and integrating or actively introducing elements from one practice into another (Suchman, 1994). For instance, students can introduce questions of interest, personal concerns and related experiences or knowledge gained online into class discussions. As a consequence, learning can be continued or deliberately extended across contexts with various actors, settings, and experiences contributing to the progressive participation and expertise development in a particular domain over time.

Based on a review of boundary crossing literature, Akkerman and Bakker (2011) have referred to this phenomenon of participation and learning across contexts as continuity in action and interaction. When it comes to learning across school and out-of-school contexts, such continuity is observed. For instance, Crowley and Jacobs (2002) found how young children often develop considerable knowledge about topics of interest and that these "islands of expertise" may be used for school subjects. Their study showed how reading specific books at home or taking museum trips with parents can spark the interest of children in topics that are picked up and elaborated on in-school essays. Similarly, Bergin (1992) found that high school experiences can create leisure interests that students pursue independently outside of school.

Bearing in mind the specificity of various contexts, however, boundary-crossing research has shown how such continuity across context is not self-evident. Even despite efforts, people may come to face differences in the various participations and perspectives they try to connect, leading to discontinuities across contexts instead. In that case, what one experiences and learns in one context cannot be related to, and may even be in conflict with what one experiences and learns in another context. Clear examples of this can be found in homework situations, where students can experience how school and home norms conflict or how particular subject matter is not necessarily valued at home (e.g., Jackson, 2011). In a study by Hughes and Greenhough (2008), for instance, a mother intends to help her child with his homework, yet differences of opinion about the appropriate method for carrying out subtractions lead to a tension-laden argument. Discontinuities require people either to shift in position and perspective or leave them troubled (Akkerman & Bakker, 2011). In the latter case, discontinuity can have severe consequences for educational trajectories in terms of potential disengagement and drop-out. Studies on dual-learning programs for example show how students are more likely to quit the program when they continue to face difficulties relating what they learn in school to what they experience at the workplace (e.g., Alsup, 2006). Similarly, Hattam and Smyth (2003) describe the alienating experiences reported by students for whom maintaining an academic identity proved to be impossible given their background, also leading to early drop-out of school.

Summarizing, a boundary crossing perspective sensitizes us to the way in which various contexts such as school and out-of-school settings can be very different in purpose, meaning, and form, but also to the way students' learning may take place across contexts, despite such differences. Learning across contexts then can be viewed as a process of prolonged engagement

[1] At the same time, we should keep in mind that contexts are not "static backgrounds", as individuals "in" a context also produce that same context (e.g., Engeström, 2009; Leander, 2001).

with a particular content or activity. Whether this is the case or not can be captured as instances of *continuity* or *discontinuity* in learning across contexts.

Despite the rich descriptions of these instances provided by typically small-scale studies, it is still unclear what constitutes continuity or discontinuity, as these studies depart from different theoretical frameworks, utilize different concepts, and employ different research designs. Generalization of findings is further impeded by the fact that research tends to be organized and communicated within subject-specific disciplines or levels of education. Mapping the various situations of continuity and discontinuity in learning across school and out-of-school contexts scattered throughout the literature allows revealing current insights as well as issues deserving more attention. It also allows us to deduce the conditions under which learning across school and out-of-school contexts can take place. Therefore, we aim to synthesize the various studies, questioning: *In what situations and under what conditions do continuities and discontinuities in learning across school and out-of-school contexts occur?*

2. Method

For this interpretative review, we conducted a paired literature search in ERIC and PsycINFO, combining:

1) the terms school OR education AND terms coined specifically for learning across contexts[2]
2) terms for out-of-school (i.e., non-school, after school, beyond school, outside school) AND learning (or synonyms[3]) in the title or abstract.

We limited the search to peer-reviewed studies, as we were looking for high-quality empirical studies. We conducted the search in January 2014 and included all articles prior to and published in 2013. The searches resulted in 881 unique abstracts.

Following our aims and research question, only empirical studies written in English that focused on learning in more than formal education were selected for inclusion. Thereby theoretical essays, educational program descriptions, and summaries of existing literature, as well as studies not explicitly addressing learning processes or outcomes (e.g., on school drop-out) were excluded. In the inclusion process, we adhered to the authors' definition of school and out-of-school context. In case of doubt, the full text was read. In seven cases, the full-text could not be retrieved, even after contacting the first author. After reading 227 articles, another 41 articles were excluded, as they did not meet the inclusion criteria.

The remaining 186 studies were first summarized and then analyzed in terms of: (a) contextual information (including domain, sample, study design, and country), (b) conceptual information (including characterizations of school and out-of-school contexts), (c) findings reported for dis/continuity in learning, and (d) conditions for (re)establishing continuity. Concerning (d), our analysis was sensitized by concepts from boundary crossing literature (cf. Akkerman & Bakker, 2011).

In the results section, we first provide a description of the included studies (using results from a), followed by a definition of school and out-of-school in relation to each other (using results from b). With respect to (c), four manifestations of (dis) continuity were identified, which are described subsequently. The results section ends with a description of the conditions for (re)establishing continuity (based on d). In light of the size of our sample, we report on the main findings with reference to specific studies for illustration.

3. Findings

3.1. Description of the included studies

An overview of the date of publication suggests a rapidly growing body of literature, as only 26 studies were published prior to 2000. As summarized in Appendix A (supplementary), the 186 studies reviewed address different levels of education, ranging from pre-school to adult education. Most studies concern primary and secondary education and a wide variety of out-of-school practices related to these levels of education; only a few studies focus on learning across contexts in vocational and teacher education.[4]

The studies are concerned with different (school) subject matters, although literacy and STEM were studied more than other subjects as reflected in the journals wherein the studies were published.[5] This is possibly because literacy and STEM are high-stake subjects, dominant in academic standards and for which established measures are available, but perhaps (also) because engagement and student diversity are particularly challenging in these subjects. Other studies did not necessarily focus on learning single-subject matter but focused on more generic skills, such as regulation and meta-cognition, or broader progressive participation and development, such as school engagement and identity development.

[2] Search terms: Boundar*-cross* or cross*-boundar* or recontextual*or informal-learn*.

[3] Search terms: Boundar*-cross* or cross*-boundar* transition* or transfer* or recontextual* or integrat* or learn* or study*.

[4] This small number of studies contrasts the existing tradition of research on learning across contexts of vocational and teacher education programs (cf. Tuomi-Gröhn & Engeström, 2003). In these traditions, other concepts are employed to refer to out-of-school learning, such as learning at work and work-related learning, which are unmanageable to include in a literature search (Tynjälä, 2013).

[5] As a result of an international project on motivation for music across school and out-of-school, music education was discussed in 10 articles.

In terms of the students studied, a substantial number (N = 73) of the articles explores the learning of learners singled out as marginal. This includes students with low achievement scores, those considered at risk or labeled as minorities because of cultural or linguistic backgrounds; it also includes students with high achievement scores or labeled as talented. The dominant focus on marginal (groups of) learners could be due to the fact that many of the investigated out-of-school contexts are targeted toward these students, as their lack of school engagement is often found to be more problematic (e.g., Grolnick, Farkas, Sohmer, Michaels, & Valsiner, 2007).

The reviewed studies have been conducted in a wide variety of (mainly) Western societies, although all continents are represented. A dominant amount of work (75%) originated in Anglo-Saxon countries. Next to a potential language bias, this could also be the result of the relatively long tradition with out-of-school initiatives in these countries.

3.2. Defining school

The conceptual distinction between school and out-of-school contexts varied extremely across the studies, regardless of the specific terminology used. With definitions frequently lacking, it was challenging to interpret the object of investigation and to compare or generalize from the studies. It should be noted that definitions are always relative, indicating simultaneously what something is and what it is not. Hence, defining school is simultaneously about defining what is out-of-school. A summing up of what is implicitly or explicitly meant by "out-of-school" in the reviewed studies reveals characteristics of school in its most traditional form. Table 1 summarizes these characteristics.

As obvious as this list may seem, it immediately shows how school, as a context, stands for many things at once. It reflects a deliberate intention towards learning. It also reflects teachers and students as central actors in an expert-novice type of relationship. Typically, school also reflects a curriculum, hence, displaying content, a structure, and following a certain rhythm. This is regardless of the specifics of such curricula, which typically change over time in response to societal discussions of what is valued and needed. Furthermore, school is often associated with validation of the intended learning by means of assessment methods. Here, several scholars have pointed to the growing culture of assessment, now visible in formal education, and the increasing risk of starting to value what we can measure rather than focusing on the question of how we can measure what we value (see Biesta, 2010). In terms of students' development, the school system reflects cumulative qualification, typically leading to educational trajectories that are staged by successive classes and educational levels and with grades and diplomas functioning as the "rite de passage". Not unimportant is the conception of school as a building, hence, a practice that may be strongly associated with a defined place and particular architecture. Finally, school stands for education that is mandatory, as often locally managed by attendance lists, gatekeepers, and a punishment system. Obviously, the latter characteristic is considered important from the students' perspective.

Overall, the various characterizations in the literature show how school contexts are typically highly regulated learning environments; in contrast, out-of-school contexts seem to allow for more time and space for students' personal interests. Nonetheless, several studies describe school contexts that allow for flexibility and adaptability (e.g., Maloch, 2005; Skerrett, 2010) and, vice versa, out-of school contexts may turn out to be highly regulated learning environments (e.g., Hock, Pulvers, Deshler, & Schumaker, 2001; James-Burdumy, Dynarski, & Deke, 2007; Tucker, Chennault, Brady, & Fraser, 1995). The reviewed studies also reflect local and situational differences between what various actors, such as students and teachers, each considered to be the school or out-of-school context. For example, whereas the designers of an after school media club intended students to pursue activities that might not be taken up at school, one of the students kept referring to the club as "a class" (Heron-Hruby, Hagood, & Alvermann, 2008). The various characterizations of the school and out-of-school contexts will also be evident in the following, when we report on the manifestations of continuity and discontinuity.

3.3. Continuity and discontinuity

The reviewed studies describe how different actors involved in the students' learning process experience or display continuity, discontinuity or both, leading us to discern four manifestations of (dis)continuity in the reviewed literature, summarized in Table 2. Single studies typically report more than one manifestation, illustrating how (dis)continuity can vary between students (e.g., with different backgrounds), between actors (e.g., teachers and students) and over time, but also for different yet interrelated learning processes (e.g., literacy and identity).

Table 1
Typical characteristics of school.

Characteristics
Learning is intended
Students and teachers as main actors, with teachers as knowledgeable others
What and how one learns is formalized in a curriculum
Validation of learning by assessment
Cumulative qualification
School building
Mandatory attendance

3.3.1. Continuity

A first set of studies reports on intended continuity; that is, practices designed and implemented in educational settings intending to (re-)establish continuity between school and out-of-school. What characterizes these studies is their up-front acknowledgement of the importance of connecting to out-of-school, empirically describing and/or evaluating interventions for that purpose (e.g., Al-Azami, Kenner, Ruby, & Gregory, 2010; Dori & Tal, 2000).

As a rule, intended continuity efforts are sponsored by one of two seemingly contrasting rationales. The first rationale is rooted in literature on informal learning and authentic education and stresses that out-of-school contexts with thematic similarity to school are more authentic, rich, and/or meaningful, offering possibilities for informal or more engaging learning (e.g., Nielsen, Nashon, & Anderson, 2009). The informal is typically contrasted to students' lack of engagement found in school, identifying out-of-school contexts to be of complementary value to school. For example, by using receipts, "authentic mathematics" is introduced in the classroom (Bonotto, 2005).

The second rationale is rooted in the literature on responsive pedagogy, critical pedagogy, dialogically oriented pedagogy, and socio-cultural theories (cf. Ghee, Walker, & Younger, 1997), which takes a critical stance towards the dominant school norm, culture, or standard. It is reasoned that for some children, experiences in school are not only different but essentially contradictory to their experiences out of school. For example, at home – the typical out-of-school context considered with this rationale – different languages or modalities are used, which are not actively endorsed or not even allowed at school (McTavish, 2009). This rationale stresses how schools are currently lacking in connecting to and hence engaging those students who are referred to as marginalized. As such, interventions sometimes include more fundamental alterations to school content, by allowing, for example, different languages (de la Piedra & Araujo, 2012) or modalities (Walsh, 2007) to be used in class or by accepting the use of everyday literacy next to academic literacy (Skerrett, 2012). Despite their different points of departure, both rationales fundamentally advocate that learning in school could be more engaging by relating to out-of-school practices; the interventions developed are of similar nature and can be described in terms of representations, hybrids, and visits – or combinations of these.

A first way of intending continuity is by using *objects or persons as representations* of practices, predominantly by bringing into school (a representation of) assorted out-of-school contexts (e.g., Miller, 2012; Sherwood, Kinzer, Hasselbring, & Bransford, 1987). In the boundary crossing literature such objects and persons are referred to respectively as boundary objects and brokers (Akkerman & Bakker, 2011). Examples include efforts to make the school content more engaging by representing students' interests in class, for instance, with using rap lyrics (Hallman, 2009; Heron-Hruby et al. 2008; Polman, 2006), new media, or online technology (Hung, Lee, & Lim, 2012; Walsh, 2007) or by personalizing instruction to match students' interests all together (Walkington, 2013). The objects in question can also represent the "real" practice outside of school (e.g., the science outside of school as reported in the study of Varelas, Kane, & Wylie, 2011). Objects can also illustrate how school content plays a role in students' wider lives, informing students, teachers, and sometimes parents of potential connections. For example, in the study by Smythe and Toohey (2009), students created pictures depicting how literacy played a role in their out-of-school contexts. In terms of persons, Duran, Duran, Perry-Romero, and Sanchez (2001) describe how role models from the community, representing home situations and possible futures, are invited in an after-school project to explain how literacy and computer skills had empowered their lives. Studies also describe how objects and persons representing school are introduced to out-of-school contexts (typically home), including student planners (Lenters & McTavish, 2013), video recordings of lessons (Feiler, Greenhough, Winter, Salway, & Scanlan, 2006), home science assignments (Solomon, 2003), and of course homework itself (Lacasa, Reina, & Alburquerque, 2002).

Second, *hybrid practices* are created in which constituents from school and out-of-school interact. Such hybrids, generally referred to as after-school, are practices with properties of both school and out-of-school, particularly in terms of the content (e.g., school and community science in Roth & Lee, 2004), the actors involved (e.g., teachers, parents and community members in Hughes & Gadanidis, 2010) and regulation (e.g., play and teaching in Bussert-Webb, 2009). The Fifth Dimension is a widely known example of a hybrid, where children learn abilities valued in school through participation in out-of-school practices, such as through (computer) games (Blanton, Menendez, Moorman, & Pacifici, 2003; Gutierrez, Bien, Selland, &

Table 2
Description of the manifestations of (dis)continuity and corresponding types of situations.

Manifestations	Types of situations
Intended continuity	using representations (objects and/or persons) from other contexts
Actors deliberately seek to connect contexts by:	creating hybrids of contexts organizing occasional visits to or structural stays in other contexts
Given continuity	engaging in similar activities across various contexts drawing on resources and experiences in various contexts
Actors report a connection between contexts in terms of:	
Given discontinuity	school context is structurally and/or culturally not attuned to other diverse and primary contexts of participation, typically home in primary and secondary education and work settings in dual programs
Actors report a lack of connection between contexts because:	
Intended discontinuity	create distance and difference learn
Actors deliberately disconnect contexts to:	

Pierce, 2011). The breadth and depth of the reported initiatives reveal just how much effort has already been devoted in many settings to adjust education in such a way that it connects more or better to students' out-of-school participations.

A third way of intended continuity is by taking students to *visit out-of-school contexts*, either on a single occasion or structurally as part of the educational program (e.g., internships). Single occasion visits described in the reviewed studies include museums (Cox-Petersen, Marsh, Kisiel, & Melber, 2003; Holmes, 2011; Tal & Morag, 2007; Tran, 2007), a zoo (Randler, Kummer, & Wilhelm, 2012), a botanical garden (Sellmann & Bogner, 2013), a student lab at the university (Glowinski & Bayrhuber, 2011), and an amusement park (Nielsen et al., 2009). Structural visits to out-of-school contexts occur in vocational or higher educational programs, described in the reviewed literature in terms of internships. In this third way of intended continuity, the out-of-school context is typically an educational(ized) setting, either institutionally or resulting from the inclusion of accompanying school assignments, intending to support students in establishing continuity, journaling being a frequent example (e.g., Ensor, 2001).

Next to intended continuity, continuity can also occur as a given. Given continuity is either deduced from the observation that students engage in similar activities in and out of school or is observed directly, when students report how both in and out-of-school contexts have informed their understanding of a particular topic of theme. In studies exploring continuity in terms of similar activities, the out-of-school contexts are defined as not *at* school. Examples include physical exercise (Koka & Hein, 2003; Papaioannou, 1997), speaking a minority language (Knubb-Manninen, 1988; Murtagh, 2007), and being involved in music (Campbell, Connell, & Beegle, 2007; Hentschke, 2010). Studies reporting on continuity in terms of how understandings of a particular theme result from different participations, for example concern students' understanding of democracy (Hoskins, Janmaat, & Villalba, 2012), history (Barton & Levstik, 2008, Barton and McCully, 2010; Carretero & Kriger, 2011), technology (Barron, 2004), HIV/AIDS (Brotman, Mensah, & Lesko, 2011), or relate to students' idiosyncratic interests more generally (Barron, 2006).

In the studies pointing to given continuity, students themselves report contexts contributing to a particular learning process, school not necessarily being the primary context. The relative contribution of school to learning becomes clear in a few retrospective studies, tracing the learning of a particular content (e.g., scale in Jones & Taylor, 2009), or a disposition (e.g., towards science instruction in Smith, 2005) over time and concluding that school seems to have had, according to the actors, only modest impact on what was learned.

It should be noted that given continuity seems to occur effortlessly and sometimes without student or teacher awareness (e.g., Furman & Barton, 2006). This should not be taken as a sign that no prior effort has been made to establish it by a teacher, student, or other actor. A study of Barton and McCully (2010) shows the effort that given continuity may require, in their case concerning the efforts of students in deliberately connecting different school and everyday sources for refining and extending their understanding of historical events. Efforts can also be recognized in educational designs, such as sharing chair/time in elementary education as a way for children to bring in their out-of school lives (e.g., Mariage, 2000).

Studies reporting given continuity as a main finding frequently depart from an ecological framework. Studies with a different point of departure, report given continuity as a surprising finding. For instance, Anderson, Lucas, Ginns, and Dierking (2000) aimed at studying the impact of a school visit by looking at an interactive science museum and subsequent classroom activities, examining the knowledge constructions of students. Unexpectedly, these authors found that students drew strongly on experiences from several other contexts (e.g., home context) in constructing cohesive theories about magnetism. Reliance on other experiences however, did not necessarily lead to the desired outcomes by teachers.

Intended or given, the studied situations of continuity in learning across in and out of school make clear that in and out of school contexts can simultaneously impact students' learning. As expected, the reviewed studies suggest that this continuity in learning across contexts is valuable, enriching students' understanding (e.g., Johansson & Sandberg, 2012), increasing students' engagement (e.g., Nielsen et al., 2009), and leading to higher grades (e.g., Alexander, Entwisle, & Olson, 2001, 2007).

In the reviewed studies, scholars also point to the backdrop of continuity, as continuity also entails that schools no longer having the monopoly on students' learning process; as the learning environment cannot be entirely regulated, what is learned can come to differ per person and evolve over time (e.g., Lantz-Andersson, Vigmo, & Bowen, 2013). In terms of outcomes, continuity implies that "unintended" (learning) outcomes may occur, which can challenge the educational perspective. This indicates that continuity may be demanding for teachers who, as stressed by McPhail (2013), are typically held accountable for adhering to the curriculum and providing students with relevant content knowledge. Continuity in students' learning across school and out of school, therefore, not only impacts students and their learning but also various other actors involved in education.

3.3.2. Discontinuity

The reviewed literature also portrays various cases in which learning processes are hampered across time and space. For some students, such discontinuity is a given, as they are structurally unable to relate their experiences in school to those out of school (e.g., Ghiso & Campano, 2013; Kenner, Gregory, Ruby, & Al-Azami, 2008; Tyler, Brown-Wright et al., 2010). Given discontinuity is mainly reported for students who, in some way or another, are (seen as) different from the standard student, including minority students, students for whom the language of instruction is a second language, students with a low SES background, students with or at risk for low achievement, but also talented students (see Appendix A). These studies make clear that the main reason for these students experiencing discontinuity is the general attunement of school to the standard or average student in terms of learning abilities, culture, and language. As a result, these students are often the (only) ones moving between different contexts. They struggle with successfully crossing the boundaries and cannot, for example, find a

way to connect the values or academic language at school to the language or values that are central at home (e.g., Phelan, Davidson, & Cao, 1991). Teachers' lack of knowledge of students' out-of-school contexts (Skerrett, 2012; Smythe & Toohey, 2009), often differing from their background, makes it more difficult, as teachers also fail to recognize, connect to, and encourage the use of the unique backgrounds, abilities, and expertise that students may bring into the classroom (e.g., Andrews & Yee, 2006; Phelan et al., 1991).

The reviewed studies not only consistently describe challenges of discontinuity that marginalized students face in school, but often also describe specific initiatives that are targeted at overcoming this discontinuity (e.g, Feiler, 2005; McTavish, Streelasky, & Coles, 2012). Such initiatives are frequently situated at the periphery of school practice, for example, initiatives in special classes or in after school settings, with activities for which other rules and assessment procedures apply and/or with a more favorable student-to-teacher ratio (e.g., Skerrett, 2012). The descriptions of these initiatives suggest that this periphery of schooling affords more freedom for teachers to adapt to particular students. This reasoning is supported by Kenner and Ruby (2013) who, among others, stress that these initiatives "operate in marginalized spaces that, precisely because of their exclusion from mainstream discourse, give teachers greater flexibility to create a curriculum responsive to their students' needs" (p. 3).

Discontinuity is also reported as a given for mainstream students in educational programs that have institutionalized an out-of-school context as part of their program (i.e. as an internship), typically in programs with a strong vocational orientation. In teacher education, for example, Nolen, Horn, Ward, and Childers (2011) find that what students learn at the teacher education institute needs to be recontextualized in their internships in schools, which is demanding for all students involved, leaving them troubled, at least temporarily. Harris and Simons (2006) describe how incorporating internships in enterprises in vocational education and training programs entails overlaying an educational practice on existing practices, bringing about tensions, not only for students but also for the educators and stakeholders in the various contexts. These findings indicate that students and other actors involved are not necessarily successful in learning across the different contexts, although this is intended by and part of their educational program. Recognition for this fact has given rise to research exploring ways of re-establishing continuity (e.g., McDonald et al., 2011), by employing and studying the same kind of representations of out-of-school contexts that we described for intended continuity.

Noteworthy is our finding that discontinuity can also be intended. Schools and teachers themselves not only strive for continuity but also deliberately attempt to keep (part of) the out-of-school out of their schools. Often coinciding with intended continuity initiatives, cases where schools intend for discontinuity show that while some aspects of out-of-school contexts might be attractive for schools, not all are deemed appropriate for (learning in) school. For instance, while street or popular culture are eagerly used as vehicles for student engagement in social studies and history discussions, the violence often depicted is considered inappropriate (Polman, 2006). Other examples wherein different rules apply in school and out-of-school contexts, concern the school-appropriate use of social media technology (Clark, Logan, Luckin, Mee, & Oliver, 2009; Greenhow & Robelia, 2009), behavior and dress code (Polman & Miller, 2010) and language use (Clachar, 2004). Heron-Hruby et al. (2008, p. 325) describe a teachers' reasoning behind not letting her students use rap in her classrooms, as, next to rap being inappropriate language at school, the teacher wants the student to learn how "to tailor her language to the setting she is in. I try to tell her, you have to use different language depending on where you are." Another example where discontinuity is intended by a teacher to support students' learning is the study of Aström (2012). He describes how physical education teachers deliberately use simplified rules and different logic in their sports lessons in school, deliberately creating discontinuity so that "expectations of the real sports disappear" (p. 125) and students can all have the same starting point.

Students themselves also report intended discontinuity, deliberately seeking distance and difference between school and out-of-school. In these studies, students do not wish to align with school goals, norms, or ways of working; they verbally or physically disengage from school practice by choice. For example, Ensor (2001) finds that during their internship at school student teachers consciously disregarded the theory they had been offered in university teacher education classes, when they considered it inappropriate for their teaching. Similarly, Tanggaard (2007) finds that students in vocational education actively disengage with either their school or work context in order to fully participate in the other. Reasons suggested by the scholars for students' intended discontinuity are that students consider schools to be a bleak version of the non-school practice in which they are involved (Zimmerman, 2012) or that students can somehow benefit from maintaining different positions in different practices, for instance, to maintain their image with peers or teachers (Furman & Barton, 2006). Furman and Barton (2006), Nolen et al. (2011), and Zimmerman (2012) all report how discontinuity intended by students follows after deliberate attempts by programs, teachers, and parents to establish continuity, hence, it might be a sort of counter-reaction. After testifying that a student uses a different yet successful counting strategy at home without wanting the teachers to know about it, Andrews and Yee (2006) argue that "[t]his presents an interesting challenge from a child's perspective to the assumption or belief that bringing the worlds of home and school closer together is desirable for all" (p. 442–443).

Overall, discontinuity in learning across school and out-of-school implies that school remains disconnected from other participations. The reviewed studies indicate that this disconnect can have different implications. As expected, discontinuity can result in disengagement with school (e.g., Delgado-Gaitan, 1988) and potentially have far-reaching consequences in terms of students' disidentification and drop out (e.g., Kozoll & Osborne, 2004). Phelan et al. (1991) are the first of the reviewed studies to report on the considerable effects discontinuity can have as "[i]t is frequently so painful that, over time, these students develop reasons and rationales to protect themselves against further distress" (Phelan et al., 1991, p. 240). Rogers (2004) portrays the lasting effects of disidentification with school on learner identities until adulthood.

In sharp contrast, a few studies report how discontinuity triggers or requires redefining and brings about learning (e.g., Grineski, 2003; Leeman, Rabin, & Roman-Mendoza, 2011). For instance, Grineski (2003) describes that student teachers reported how their understanding of factors influencing youth development needed to be transformed after having acted as mentors for children from disadvantaged backgrounds. Although there appears to be a general preference for continuity, there is also some recognition for this potential of discontinuity for learning in the reviewed studies (e.g., Nielsen et al., 2009). Departing from this assumption, Maddock, Drummond, Koralek, and Nathan (2007) describe how several schools deliberately invited creative practitioners to work with their students on innovative responses to contemporary issues, expecting the practitioners' approach to disrupt and thereby challenge existing schooling routines.

3.4. Conditions for (dis)continuity

In the reviewed literature, various conditions are mentioned for (re)establishing and sustaining continuity. Overall, it becomes clear that similarity of school and out-of-school contexts enhances a sense of continuity, not requiring specific efforts (cf. Demerath, Lynch, Milner, Peters, & Davidson, 2010; Phelan et al., 1991). Nonetheless, even if school and out-of-school contexts are different, there are ways to (re)establish continuity. In line with the literature on boundary crossing, the reviewed literature points to brokers, boundary objects, and boundary interactions as key ways to (re)establish continuity (Akkerman & Bakker, 2011), although the reviewed studies do not necessarily use these terms.

With respect to the broker position, the reviewed literature underscores how some individuals appear to be more skilled to act as broker, as has been suggested by Walker and Nocon (2007). This so-called competence as broker is highlighted by looking at the contrasting cases of given discontinuity, where students and other actors have difficulties connecting various participations versus intended discontinuity, where various actors appear to be capable of (deliberately) shifting between contexts. In these cases, students show a good understanding of the different expectations in the different contexts (e.g., Furman & Barton, 2006). In recognition of this, supporting students in being able to cross boundaries independently is discussed in the reviewed studies. For instance, different authors discuss the importance of learning how different rules apply to different settings (e.g., Bonotto, 2005; Hildebrand, Spafford, & Schryer, 2009). The reviewed studies show that teachers can also demonstrate an ability to act as broker in school, supporting students in learning across contexts. This ability is mainly reported when teachers have a similar (minority) background as the students and, hence, a better understanding of the out-of-school context (de la Piedra & Araujo, 2012).

With respect to boundary objects and interactions, it is noteworthy that in the majority of the studies, their introduction, as well as the teachers' role as broker, were purposefully designed and introduced by school. Such one-sided development could constrain the embodiment of multiple meanings and perspectives that define boundary objects (Akkerman & Bakker, 2011).

While these ways to re-establish continuity hold potential, they also bring about new challenges, which are mainly discussed in relation to school, as school is mostly held responsible for students' learning across contexts (see also Table 3). First, when schools seek to introduce out of school practices in school by means of representations or visits, this can entail engaging with (elements of) practices with which teachers have little affinity or expertise. Technology is a well-known example where students are expected to have and often show more expertise (e.g., Xiao & Carroll, 2007). As a result, the changes to the school content can be "superficial", with students immediately diagnosing them as (futile) attempts at connecting to their wider lives or the outside world that do not mediate learning. This has been referred to as sugarcoating (Pugh, 2004; drawing on Dewey, 1913), and we concur with Polman (2006, p. 250) that "[e]ducators cannot merely bring in artifacts from domains of persistent engagement in hopes of learners' positive disposition toward the material 'infecting' identity trajectories in a wholly different community of practice."

When the changes to the school practice are (more) fundamental, for instance, by allowing a different modality (i.e. an adjustment of the rules and tools of school), a second challenge emerges, as schools need to ensure that all mandated content also be covered (Skerrett, 2011). This dilemma increases in cases where students' out-of-school practice is actually contradictory to or unaccepted at school, as is the case with, for instance, different 'Englishes' (Clachar, 2004) or conflicting information sources (Brotman et al., 2011).

A third group of challenges comes to the fore when schools seek to extend their influence in other practices, for instance, by using homework assignments. These assignments can be interpreted differently by other actors and can even be actively contested (Lenters & McTavish, 2013). Additionally, visits – of varying duration – to out-of-school contexts are typically accompanied by an educational infrastructure. Such attempts at modeling the out-of-school practice to resemble, match, or

Table 3
(Im)possibilities for school to establish continuity.

Possibilities	Challenges
Utilizing:	Going beyond sugarcoating
• Brokers	Simultaneously meeting standards
• Boundary objects	Considering educationalizing
• Boundary interactions	Ensuring sustainability
Underlying condition: degrees of freedom afforded by school	

extend school have another drawback, namely that such 'educationalizing' limits the potential to provide a complementary or contradictory experience (cf. Moss, 2000; Tran, 2007), which is the reason these out-of-school contexts have been selected. Also, questioning this tendency, Kliman (2006) designed educational games that parents would not associate with school.

While the positive and negative effects and subtleties of sugarcoating and educationalizing call for further research, a remaining discussion of a somewhat different nature is to what extent the current educational system can more structurally allow for the intended adaptability and inclusion. With most studies reporting first-time interventions and short-term outcomes, the reviewed studies therefore also lead to a question of sustainability, that is, whether and how the initiatives can be effectively realized in the long-term, especially since they are highly time and resource consuming and often seen as "extra".

Considering these challenges, there appears to be one main underlying condition for (re)establishing continuity with out-of-school contexts: that is, the *degrees of freedom* afforded in school. With degrees of freedom, we mean the freedom to accommodate out-of-school elements in the school, institute, or system. This freedom can refer to, first of all, time and space allowed in a lesson or curriculum to address out-of-school aspects of students' lives, for instance, having students share their own experiences related to the subject matter. Recognition for the need for such time and space is particularly seen in initiatives based on given discontinuity findings, where there is awareness among the studied teachers that there is a need to connect to students who otherwise would not be engaged in the lesson. Secondly, this freedom can refer to the adaptations made in school to not only recognize students' wider lives but to also validate students' out-of-school participations, for instance, by including it in assignments and assessments. This freedom for validation is already common in educational programs with internships. A last and more far-reaching expression of freedom is when the outcomes and content of school-learning processes are left open (for discussion); in the reviewed literature, this latter type of freedom is typically not scheduled as part of standard curricula but allotted to extra-curricular time and space. The various studies reporting on initiatives to overcome discontinuity suggest that schools can differ strongly in the extent to which they allow for such alterations, seemingly more when a school takes differences between students as a point of departure (Milian & Pearson, 2005).

4. Discussion

In the introduction of this literature review, we argued that educational research has been expanding its scope by developing a multisystemic perspective and looking at the way learning takes place, not only within a single (school) context but also across school and out-of-school contexts. Such explorations are highly relevant and timely, as the landscape of education is fundamentally changing; the position of school is no longer fixed and dominant but increasingly considered in relation to the equal contributions of out-of-school contexts to learning. In light of these changes in the educational and scientific field, we set out to review the literature, asking: *In what situations and under what conditions do continuities and discontinuities in learning across school and out-of-school contexts occur?*

Our answers to this question start with recognizing that school and out-of-school contexts do not reflect a fixed underlying dichotomy but a permeable analytic distinction. What defines school depends very strongly on the local context and characteristics that are under scrutiny of researchers. It is important to highlight this finding, as this means that school itself is a questionable concept. Only in its most strict form does school refer to a highly regulated learning environment, that is, a formal and institutionalized educational practice and place that is aimed at fully planned, guided, regulated, and validated forms of learning (see Table 1 for typical characteristics of school). As becomes visible throughout the review, actual school contexts differ to a great extent and are under influence of the new initiatives that are undertaken, by adapting and, in some cases, deliberately connecting to other contexts of participation to enhance student learning. Similarly, out-of-school contexts can be opposite to school contexts but may also show many typical school characteristics.

With respect to the *situations* in which continuities and discontinuities occur, we find similar multiplicity; the reviewed literature indicates that continuities and discontinuities are not tied to specific situations but rather occur within and across different subject domains, levels of education, institutions, and countries. Based on the reviewed literature and in light of the current debates on education, we distinguished between intended and given (dis)continuity (see Table 2). Intended continuity is reported for initiatives that depart from the assumption that out-of-school contexts have distinct characteristics and afford learning in a way that school does or cannot. The inclusiveness and responsiveness of these initiatives shows promise, their design demonstrates originality and resourcefulness, and their results indicate richer engagement and learning. It should be noted that in spite of all this, initiatives intending for continuity do not secure continuity and they can bring about (additional) discontinuities, revealed by research on programs that have deliberately institutionalized out-of-school contexts. Studies reporting given continuity highlight how continuity in learning across school and out of school also occurs without visible effort and sometimes even without student or teacher awareness (of its consequences). The literature reporting given continuity reminds us of the potential learning ecology that we need to be continuously aware of as educators and researchers, to develop better explanations and support of learning processes. As also stressed by Barron (2006, p. 193), "by focusing on schools and labs as primary research sites we miss opportunities to investigate learning when it flows from the initiatives of the learner and his or her companions across time and settings."

Distinguishing given from intended discontinuity foregrounds important differences in the nature and consequences of discontinuity. Given discontinuity chiefly concerns marginalized students – those students who are considered to be a minority, academically at risk, or both, with potentially far-reaching negative effects. This elucidates the importance for educators to adapt education to individual students, especially to those for whom education can possibly make the difference.

In contrast, in situations of intended discontinuity, the differences and distance between school and out-of-school contexts are not avoided but deliberately sought by schools but also by individual students. Studies on intended discontinuity create awareness for educators as well as researchers that continuity is not always desirable and that some differences and distance between school and students' life outside of school can be valuable in their own right.

Considering the *conditions* under which continuities and discontinuities in learning across school and out-of-school contexts occur, our findings highlight the complicated challenges schools face in connecting to out-of-school contexts (see also Table 3). These include going beyond sugarcoating (i.e., superficial alterations without consequences for learning and teaching) in connecting to out-of-school, (also) meeting existing curricular standards, especially if out-of-school is contradictory to school, deliberating when and where educationalizing (i.e., imposing an educational structure, canceling out unique properties of out-of-school) is (still) constructive and ensuring sustainability of the initiatives with scarce resources, not in the least time.

In light of these challenges, the importance of *degrees of freedom* afforded in school comes to the fore. This freedom can range from time and space allowed in lessons and the overall curriculum, to recognition and validation of learning taking place out of school and, ultimately, to allow some alteration of content and outcomes, hence, leaving open what is valued and validated in the first place. Precisely at the point of freedom, the current school system finds itself in an almost impossible balance. Whereas current societal developments require schools to become fundamentally adaptive to individual students, schools' most typical characteristics do not seem to allow for such flexibility. It can be noted that these characteristics cannot simply be changed; they are historically shaped and informed by a widely held political and economic ideology towards qualification for all and with academic standards in several highly valued subjects. Along with increasing emphasis on institutional performance and accountability, such ideology enforces standardization in education rather than flexibility and open outcomes (Biesta, 2010; Roth, 2015).

4.1. Future research

This review should be seen as a first step in understanding learning across school and out-of-school contexts and in identifying the key elements in this process. As most of the reviewed studies concern single case studies, more systematic and larger-scale research is valuable for determining patterns of given (dis)continuity, as well as when and where continuity but also discontinuity is intended, all in relation to students' age, level of education, subjects of interest, and contexts of participation. Given the subtleties that have become visible in the reviewed studies, large-scale research should not forget to include the specificities of the school and out-of-school contexts of individual students. More specifically, our understanding of learning across contexts would benefit from exploring in what respects, if any, out-of-school differs from school, according to students, empirically. What is key here, is to study learning across contexts in terms of different practices, going beyond identifying contexts based on moments of time (e.g., in and after school time) and place (e.g., in or outside the school building), except when such aspects are found to be consequential for the way in which interactions and activities and learning processes take place (as turned out to be the case in Jenner & Jenner, 2007; Polman, 2006). This seems especially pertinent as our analysis has reaffirmed how school, although easily diagnosed for being different from or unresponsive to out-of-school in whatever capacity, needs not necessarily lead to discontinuity and how intended or researcher-observed similarity does not necessarily equal continuity.

Taking multisystemic research on learning a step further calls for new methodological designs suitable for capturing open-ended learning within and across different contexts. Specifically complex here is that the kind of contexts relevant to include likely differ per student and his or her specific life ecology (Barron, 2006) and, therefore, cannot easily be defined upfront. We take the designs of the reviewed studies as but a first step in this direction, as many studies address only two purposefully selected and predefined contexts of learning. Tracing individual students' lives and contextualizing activities and opportunities for learning, wherever they appear to be, would be a way forward.

The contemporary debates about school and the critical stance underlying most of the reviewed literature may easily give the impression that the current school system is no good. Though it is obviously important to be continuously reflective and critical when it comes to an institution that most people attend from early age on, we should be careful about rejecting the system altogether, before grounding ones' own ideology (e.g., of creativity, flexibility) in favor of the multitude of existing ones. What we need is a balanced debate, cognizant that school can never be a simple solution to all our societal problems.

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Appendix A

Type of learners, level and subject of education in reviewed studies.

Typifications of learners in the studies level and subject of education		Low achieving, at risk, or minority group	High achieving or talented	Regular, representative or not specified
Preschool	Literacy			Cohen and Uhry (2011)
	Other	Pretorius and Naude (2002)		
Primary education	Academic skills & achievement	Ghee et al. (1997); Sah and Borland (1989)	Sah and Borland (1989)	
	Creative development	Maddock et al. (2007)		Cohen (2011); Smithrim and Upitis (2005)
	History			Cox-Petersen et al. (2003); Polman (2006)
	Literacy	Al-Azami et al. (2010); Bussert-Webb (2009); Condron (2009); Downey, von Hippel, and Broh (2004); Gutierrez et al. (2011); Jenner and Jenner (2007); Juel (1988); Kenner et al. (2008); Kenner and Ruby (2013); Knubb-Manninen (1988); Li (2010); Mariage (2000); McTavish (2009); McTavish et al. (2012); Milian and Pearson (2005); Smythe and Toohey (2009); Tucker et al. (1995)		Blanton Moorman, Hayes and Warner (1997); Blanton et al. (2003); Condron (2009); de la Piedra and Araujo (2012); Downey et al. (2004); Feiler (2005); Feiler et al. (2006); Hobbs (2013); Kennedy (2008); Knubb-Manninen (1988); Lacasa et al. (2002); Lenters and McTavish (2013); Maloch (2005); McDonald et al. (2011); Moss (2000); Sherwood et al. (1987)
	Music education			Juvonen (2011); Lamont, Daubney, and Spruce (2012); Portowitz, Gonzalez-Moreno, and Hendricks (2010)
	STEM	Andrews and Yee (2006); Ash (2004); Bussert-Webb (2009); Condron (2009); Downey et al. (2004); Duran et al. (2001); Jenner and Jenner (2007); Miller and Gentry (2010); Tucker et al. (1995); Turner, Gutierrez, Simic-Muller, and Diez-Palomar (2009); Varelas et al. (2011)	Miller and Gentry (2010); Randler et al. (2012)	Anderson et al. (2000); Baumert, Evans, and Geiser (1998); Blanton et al. (1997); Bonotto (2005); Condron (2009); Dori and Tal (2000); Downey et al. (2004); Eloff, Maree, and Miller (2006); Feiler et al. (2006); Holmes (2011); Kliman (2006) Solomon (2003); Tal and Morag (2007); Tran (2007); Vedder-Weiss and Fortus (2013); Zimmerman (2012)
	Other school or out-of school subjects or general learning processes	Alexander et al. (2001); Cheadle (2009); Guberman (2004); Jenner and Jenner (2007); McCreary et al. (2011); St. Pierre and Kaltreider (2001); Powell and Peet (2008); Walker and Nocon (2007)	Moon, Swift, and Shallenberger (2002)	Alexander et al. (2001); Bailey and Thompson (2008); Fields and Kafai (2009); Ghiso and Campano (2013); Hung et al. (2012); James-Burdumy et al. (2007); Poveda (2001); So, Seow, and Looi (2009); van Kraayenoord and Paris (1997)
Secondary education	Academic skills & achievement	Brown-Wright and Tyler (2010); Ghee et al. (1997); Langberg et al. (2006); Tyler et al. (2010)		Miguel and Crowe (1983)
	Creative development	Maddock et al. (2007)		Cohen (2011); Kan (2008)
	History			Barton and Levstik (1998); Barton and McCully (2010); Polman (2006)
	Literacy	Hall (2007); Hallman (2009); Moje, Dillion, and O'Brien (2000); Naidoo (2009); Skerrett (2012); Tucker et al. (1995); Walsh (2007); Yi (2005)		Evans and Rosenbaum (2008); Heron-Hruby et al. (2008); Keith, Diamond-Hallam, and Fine (2004); Knapp (2002); Lantz-Andersson et al. (2013); Leander and Lovvorn (2006); Moss (2000); Murtagh (2007); Roth and Lee (2004); Sherwood et al. (1987); Skerrett and Bomer (2011); Sturtevant and Kim (2010); Tal and Morag (2007); Taylor and Hoechsmann (2011); Teo (2008)
	Music Education			Campbell et al. (2007); Cassidy and Paisley (2013); Hentschke (2010); Juvonen (2011); McPhail (2013); Portowitz et al. (2010)
	STEM	Al-Balhan (2008); Boaler (1998); Bruyere, Wesson, and Teel (2012); Furman and Barton (2006); Hock et al. (2001); Kozoll and Osborne (2004); Tucker et al. (1995)	Matthews and Farmer (2008); Sellmann and Bogner (2013)	Barron (2004); Ben-David Kolikant (2012); Brotman et al. (2011); Ciani, Ferguson, Bergin, and Hilpert (2010); Clark et al. (2009); Evans and Rosenbaum (2008); Fuligni and Stevenson (1995); Gennaro, Hereid, and Ostlund (1986); George (1999); Glowinski and Bayrhuber (2011); Grolnick et al. (2007); Hughes and Gadanidis (2010);

(*continued on next page*)

(*continued*)

Typifications of learners in the studies level and subject of education		Low achieving, at risk, or minority group	High achieving or talented	Regular, representative or not specified
				Kass and Macdonald (1999); Keith et al. (2004); Kliman (2006); Martin and Gourley-Delaney (2013); Nielsen et al. (2009); Papaioannou (1997); Pugh (2004); Reynolds and Chiu (2013); Rose and Barton (2012); Tamir (1991); Vedder-Weiss and Fortus (2013); Walkington (2013); Walkington, Petrosino, and Sherman (2013); Xiao and Carroll (2007); Zimmerman (2012)
	Other school or out-of school subjects or general learning processes	Bergin (1989); Choi (2009); Delgado-Gaitan (1993); Demerath et al. (2010); Greenhow and Robelia (2009) Mayer, Quilici, and Moreno (1999); Polman and Miller (2010); Relano Pastor (2010); Simpkins, Delgado, Price, Quach, & Starbuck, 2013; Walker and Nocon (2007)	Delcourt (1993); Demerath et al. (2010); Geier and Bogner (2010)	Alexander, Entwisle, and Olson (2007); Bailey and Thompson (2008); Bergin (1996); Chen & Chen (2014); Chen and Shen (2004); Fields and Kafai (2009); Hoskins et al. (2012); Hung et al. (2012); Koka and Hein (2003); Miller (2012); Phelan et al. (1991)
Vocational education	Academic skills & achievement			Miguel and Crowe (1983)
	Other			Alexander et al. (2007); Berner (2010); de Lange (2011); Harris and Simons (2006); Hildebrand et al. (2009); Tanggaard (2007)
Higher education	Academic skills & achievement	Clachar (2004)		Derous and Ryan (2008); Hendel (1985)
	History			Carretero and Kriger (2011)
	Literacy	Abukari and Laser (2013)		Abukari and Laser (2013); Gu and Tong (2012)
	Music education			Feichas (2010)
	STEM	Abukari and Laser (2013)		Abukari and Laser (2013); Barron (2006); Smith (2005)
	Other subjects or general	Abukari and Laser (2013); Boulton-Lewis, Marton, Lewis, and Wilss (2000)		Alexander et al. (2007); Abukari and Laser (2013); Leeman et al. (2011)
Teacher education	Literacy			Skerrett (2010);
	Music education			Finney (2010); Wright and Kanellopoulos (2010)
	STEM			Ensor (2001);
	Other subjects or general learning processes	Grineski (2003)		Aström (2012); ;Blanton, Simmons, and Warner (2001) Johansson and Sandberg (2012); McNamee (1995); Nolen et al. (2011); Perry et al. (2006); Tsui and Law (2007)
Professional/adult education	Literacy	Rogers (2004)		Jones and Taylor (2009)

Note. Studies can address more than one level and subject of education, as well as different groups of learners simultaneously.

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