Learning across Settings and Time in the Digital Age

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Abstract

Recent scholarship in the interdisciplinary field of the learning sciences has focused on the ways that young people use digital tools to connect learning experiences across different settings and over time. Two aspects stand out in this research: (i) the potency of youth agency in creating new activities, communities, and pathways for interest-related pursuits and (ii) the ways that peers, adults, and different sociocultural contexts afford and constrain opportunity. These contexts, or settings, include peer groups and families; schools, neighbourhoods and cities, and also nationwide infrastructures that foster connections between school-based and out-of-school learning. The articles in this special issue of *Digital Education Review* shed light on these topics and advance our understanding of the theories that deal with learning across various settings and times, and how to promote more equitable youth learning across these settings.

Keywords

Learning sciences; Learning across contexts; Learning pathways; Repertories of practice

Learning is a pervasive and dynamic process that unfolds through social and cultural transactions over time and across various settings. Nowadays, more than ever before, schools are not the only contexts for learning, nor are they necessarily the most significant to youth. Science, for instance, is not confined to schools; it is distributed among other resources, sites and people. Indeed, young people who choose science as a career are more likely to attribute their choice to some endeavour they have pursued outside of school, such as a hobby or a love of conducting experiments (Tai, Liu, Maltese, & Fan, 2006).

A recent study involving one of the authors of this introduction, aimed at identifying 'meaningful learning experiences' (MLEs) from diaries kept by 15 and 16-year-old adolescents, shed light on the *informationalism* and *informalization* of learning in 21st century social activity systems (Esteban-Guitart, Serra, & Vila, 2017). At the end of each day, these adolescents wrote down the most important learning experience they had had that day, where and how it had happened, with whom, and what they had felt about it. In total, 43 MLEs were identified. One of the most surprising findings was that none of the experiences identified had taken place in school situations. On the contrary, all of them had taken place out of school context. Moreover, the vast majority of these learning experiences were mediated by the use of digital devices and took place *across various settings*, or else in what Gee (2005) calls 'affinity spaces', i.e., any physical or virtual space (such as a Facebook group), where people can contribute in many different ways with different people with whom they share an interest, a passion, or an activity. In addition, the learning became a process that unfolded *across various events*, with different moments or episodes involved in and linked through an individual's agentic activity. For example, from the initial act of seeing a previously unknown product in a hairdresser's, to searching the Internet for it and asking teachers and parents about it the day after, to then buying the product, using it and sharing the experience with friends and colleagues online.

Indeed, extracurricular activities undertaken outside of school hours represent important learning opportunities, enhanced with the support of peers or mentors. Within online communities, people can make and share cultural artefacts such as videos, images and texts and thus contribute to the interest-driven trajectories of young people – connecting their passions, popular culture, forms of engagement and interests to academic, work or civic domains (Bell, Tzou, Bricker, & Baines, 2012; Ito et al., 2013; Penuel, Clark, & Bevan, 2016). Collectively, these opportunities form particular learning ecosystems, which are made up of an array of activity settings found in physical or virtual spaces, relationships and numerous types of learning resources both in and out of school (Barron, 2004, 2006).

The digital age, in our view, has led to a proliferation of distributed learning resources and learning contexts far beyond the confines of the school, which—until recently—had been the institution traditionally charged with passing on the cultural artefacts valued by the surrounding community (Coll, 2013). In other words, learning is now profoundly tied to participation in situated and distributed online and face-to-face spaces, located across a range of people, tools, places, and contextually-sensitive practices. In these sociocultural contexts, a shared concern, affinity, passion or interest for knowing something, for sharing a meaning, for becoming a certain kind of person (developing an identity), or for solving problems of a certain sort is a kind of glue that binds people, more or less tightly, together.

In most videogames, blogs, YouTube channels, Facebook pages or in other, physical places and activities, learners are performing some kind of *action* in order to take in the experience, they *care* emotionally about the outcome of the action, and something or someone is helping the learner to orient their *attention,* guide their *participation,* and create systems for *recognizing* contributions to online and face-to-face communities. Action, caring and well-managed attention or recognition are the components of the processes referred to as *deep teaching and learning* (Gee, & Esteban-Guitart, in press). Learning is deep when it is holistic, when it involves not only processes of knowledge (*knowing*), but also of affectivity, interest, passion —what Immordino-Yang and Damasio (2007) referred as "emotional thought"— and evaluation/appreciation (*evaluating-recognizing*), with regard to both action (*doing*) and identification (*being*). This occurs, for example, when someone who is learning about art, let's say, moves among various spaces, both virtual and real guided by a particular interest or passion, and constructs knowledge in relation to art in general, or a specific artist, in particular. They might take this action on a web page, in a museum or with a group of friends, and they might identify with a particular artistic discipline, a specific style or painter, which they value and appreciate. Another example might involve cooks and cooking, to which a large number of affinity spaces are devoted. There are many kinds of food; cooks can be traditional or modern, or both; they can cook with organic products or highly processed ones; they can specialize in deserts; they can engage in community cooking or cook at home; they can be casual cooks, high-tech cooks, or serious, professional chefs. These are only a few of the many different things a cook can be and do.

In these examples, it is impossible to locate teaching and learning in one person, or one location; rather, it is located across many people, tools, locations, and contextually-sensitive practices. This means that learning becomes a process defined by itineraries, pathways (Barron, 2010), developing "lines of practice" (Azevedo, 2011) or personal trajectories of participation across contexts of social practice (Dreier, 1999; Erstad, 2015). In this regard, learning can be considered

as a 'single story' experienced across different settings, by using different media, with the assistance of different people. But a 'single story' does not mean defining learning as a unitary and static process, or as a product of general cognitive traits or specific individual strategies. Instead, it means considering learning as a process involving "repertoires of practice" (Gutiérrez, & Rogoff, 2002), which accumulate the variations in the stories of participation and engagement by individuals and groups in cultural practices. Consequently, the focus is on the ways that the learners' practices are developed across hybrid spaces and activity systems, in boundary and border crossings, and learning is defined as "movement", the circulation of cultural meanings, objects, interests, identities and the transformation of participation and engagement in sociocultural practices diffused in time-space, rather than knowledge acquired solely in the learner's head (Barron, 2010; González-Patiño & Esteban-Guitart, 2014; Lave, & Wenger, 1991; Vossoughi & Gutiérrez, 2014).

In particular, recent scholarship in the interdisciplinary field of the learning sciences has focused on ways that young people use digital tools to connect learning experiences across different settings and over time (Barron & Bell, 2015; Erstad, 2015; Esteban-Guitart, 2016; Jenkins, Ito, & Boyd, 2016; Lee, 2017; Penuel, DiGiacomo, Van Horne, & Kirshner, 2016). Two aspects stand out in this research: (i) the potency of youth agency in creating new activities, communities, and pathways for interest-related pursuits and (ii) the ways that peers, adults, and different sociocultural contexts afford and constrain opportunity. These contexts, or settings, include peer groups and families; schools, neighbourhoods and cities; and also nationwide infrastructures that foster connections between school-based and out-of-school learning.

The question arises as to the circumstances in which we find these connections between school-based and out-of-school learning. How does this learning across contexts and time happen? A recent review of the literature posed a similar question: *In what situations and under what conditions do (dis)continuities in learning across school and out-of-school contexts occur?* Based on the literature reviewed, Bronkhorst and Akkerman (2016) distinguished between *intended* and *given* (dis)continuity. *Intended continuity* refers to any practice designed and implemented in educational settings aimed at establishing continuity between the school and out-of-school contexts. For example, Silseth and Erstad (2018) described how, over one academic year, four secondary teachers used their students' everyday experiences as tools for teaching in-school subjects. The findings report the teachers orienting school practice to reflect a variety of local issues: the characteristics of the local community, examples of everyday practices, personal issues, specific objects, and travelling abroad. In a similar vein, a review of the literature on the funds of knowledge approach identified three strategies that help to connect the curriculum and school practice to

student's lives. The first of these refers to a dialogue and a comparison between a text and personal experiences. The second is manifested by students doing empirical studies of their living conditions and those of their communities. Finally, the third highlights the use of students' popular culture as a way of linking the curriculum with the learners' interests and lives (Llopart, & Esteban-Guitart, 2017).

Intended continuity can be developed by bringing out-of-school contexts and experiences into the school. In this sense, the concept of *identity artefacts* has been suggested to refer of any product or document created by the learners about themselves, such as written texts, artistic productions, photographs, drawings, collages, digital productions and so on, in which the learners try to capture all the things that make sense and are meaningful to them and which, subsequently, can be used by teachers to work on curricular and pedagogical content (Subero, Llopart, Siqués, & Esteban-Guitart, 2018). These particular artefacts, used with pedagogical aims, allow teachers to mobilize knowledge and connect experiences in and out of school, as well as to improve agency and school involvement (Jovés, Siqués, & Esteban-Guitart, 2015; Subero, Vujasinovic, & Esteban-Guitart, 2017). In the literature on "boundary crossing", such objects or persons are referred to respectively as boundary objects and brokers (Akkerman, & Bakker, 2011). For example, specific goals in mathematics and science can be developed by preschool-based interventions that use public television programs, offering guided viewing of programs for children and families, playing games, hands-on activities and so on. Because the preschool context includes resources for parents, families can extend their children's learning at home, creating educational continuities in and out of school contexts and practices through many resources such as television broadcasts or games and activities (Penuel et al., 2010).

Another way to achieve intended continuity is by creating *hybrid practices* that mix in-school and out-of-school elements. For example, in the Fifth Dimension international project, children work on certain school competencies, such as literacy or mathematics, using computer games in an after-school setting (Cole & Distributed Literacy Consortium, 2006).

Finally, a third example of intended continuity, identified in a revision of the literature by Bronkhorst and Akkerman (2016), consists of taking students on visits to out-of-school contexts such as museums, zoos, a botanical garden, a student lab at the university, and so on.

In contrast to *intended* continuity, *given continuity* refers to the continuity in learning across settings without visible effort and sometimes even without an awareness of its consequences on the part of the student or teacher. In these cases, the continuity is inferred from the observation that students engage in

activities of a certain kind in order to improve their understanding of a particular topic or develop a degree of competence. For example, Barron (2010) documented the trajectories of two boys of the same age (Jonathon and Andres) as they became technologically fluent. Their learning ecologies were different from each other and this had an impact on their personal trajectories and learning outcomes.

Discontinuities are also central to the study of interest-related pursuits. At a basic level, they derive in part from the basic fact that settings of practice are separated from one another in space and time (Dreier, 2008a), giving rise to the need for boundary crossing Akkerman and Baker (2011) describe. Interest-related pursuits depend on supportive social and material conditions, including a feeling of belonging when engaged in the activity and the necessary tools and technologies for the pursuit (Allen et al., in this issue). When conditions change to become unsupportive, discontinuities in pursuits may arise (DiGiacomo, Van Steenis, Van Horne, & Penuel, in press; Van Horne, Van Steenis, & DiGiacomo, 2016). Youths' own goals for the future may shift as well, leading them to drop pursuits (DiGiacomo et al., in press). Young people may also preserve discontinuities out of a desire to create separate social spaces for different activities and identities. These findings remind us that discontinuity is also constitutive of interest-related learning in and out of school and that it is critical not to adopt the view that continuities are always desirable in development.

In this special issue of *Digital Education Review*, comprising 13 articles that focus on these topics, we shall examine our current understanding of learning (dis)connections in and out of school, and how to promote more equitable youth learning across the diverse settings of the 21st century.

Advancing our understanding of how to expand our theorizing of learning across settings and time

All the articles in this special issue, more or less explicitly, problematize the traditional understanding of *context* or *setting*. Although, in itself, this is not new, it does seem to us a significant contribution because it confirms a tendency to abandon the more or less static and homogenizing dimensional perspectives of cultural phenomena and, instead, moves towards more process-oriented models that reflect the liquid, situated and hybrid nature of human reality and experience.

In Bronfenbrenner's ecological systems theory, *setting* (considered as the scenario where change, learning and human development takes place) was defined as that physical space, with fixed and clear boundaries, that encompasses a developing person who engages in activities, interpersonal

relationships and adopts certain roles. The school, the family, the church, the work environment, as defined scenarios of interaction, are typical examples of what is commonly understood by the term "microsystems".

> "A microsystem is the complex of relations between the developing person and environment in an immediate setting containing that person (e.g., home, school, workplace, etc.). A setting is defined as a place with particular physical features in which the participants engage in particular activities in particular roles (e.g., daughter, parent, teacher, employee, etc.) for particular periods of time. The factors of place, time, physical features, activity, participant, and role constitute the elements of a setting." (Bronfenbrenner, 1977, p. 514).

In contrast, if one thing characterizes the settings described in the various studies brought together in this special issue, it is their polyphonic and hybrid nature. Digital, wireless mobile devices have transformed practices and new resources and opportunities for learning have appeared. However, this does not mean that productive educational uses or subjective learning experiences will also appear automatically and spontaneously, as demonstrated in the study by Engel, Coll, Membrive, & Oller (in this issue). We need to foster the development of digital literacy and "reflective participation" (Cortés, García, de la Fuente, Martínez, & Lacasa, in this issue); that is, there needs to be a certain social mediation; for example, intentional "joint media engagement" (Stevens & Penuel, 2010) and educative "architecture" to turn media into learning practices. There are many examples of the techno-pedagogical design of educative architecture in this special issue, including the transmedia story "The Ancestral Letter" described by Molas-Castells & Rodríguez Illera; the *iPad with literacy-related content* from the study by Levinson & Barron, the use of digital texts of identity produced by college learners of English as a foreign language (Garcia-Pastor); the Pikler Seminar, in Madrid, as an expanded and digitally mediated community (González-Patiño); the generation of cartographies to identify and discuss teachers' learning trajectories (Hernandez-Hernandez, Sancho-Gil, & Domingo-Coscollola); the FUSE Studio, in the framework of the new core curriculum for the education of 7- to 16-year-olds that is part of the reform of the education system in Finland (Kumpulainen, Kajamaa, & Rajala); the incorporation of iPads in the *Matadero de Madrid* with boys and girls between 8 and 14 years old (Cortés et al.); the multimodal experience in higher education relating to art and aesthetic experience as scaffolding for the creation and reflection of content in social sciences (Ramírez, Hernández-León, Figueroa-Sandoval, & Aillon-Newman); and the use of online social media space ("Seesaw") to engage parents in student learning in the early-years in Australia (Willis & Exley), all of which appear in this special issue.

In all of these situations, the boundaries between the in and out of school are diffuse. It is not possible, for example, to locate the setting of development – or microsystem – in the experience described by González-Patiño (in this issue);

although the physical environment in which the community of practice develops is a public institution, called *Medialab-Prado Madrid* and run by the City of Madrid, there are other "settings" that overlap polyphonically, such as *Mediática*, (a group based at the Autonomous University of Madrid), and the *Asociación Española de Escuelas Infantiles de Gestión Indirecta* (AMEIGI), which are further extended and distributed over time from the hub – a repository of content and resources that combines tools to facilitate the creation of content, participation and communication – which includes a Twitter account, a Facebook group, a YouTube channel, etc. In any case, rather than a microsystem, it is more of a network, a set of microsystems: what is known as a *mesosystem*. However, technically, these are not settings where the participants have an active participation, nor are we dealing with what might be called an *exosystem*.

> "A mesosystem comprises the interrelations among major settings containing the developing person at a particular point in his or her life. Thus, for an American 12-year-old, the mesosystem typically encompasses interactions among family, school, and peer group; for some children, it might also include church, camp, or workplace, although the last would be less common in the United States than in some other societies. In sum, stated succinctly, a mesosystem is a system of microsystems." (Bronfenbrenner, 1977, p. 515).

> "An exosystem is an extension of the mesosystem embracing other specific social structures, both formal and informal, that do not themselves contain the developing person but impinge upon or encompass the immediate settings in which that person is found, and thereby influence, delimit, or even determine what goes on there. These structures include the major institutions of the society, both deliberately structured and spontaneously evolving, as they operate at a concrete local level. They encompass, among other structures, the world of work, the neighborhood, the mass media, agencies of government (local, state, and national), the distribution of goods and services, communication and transportation facilities, and informal social networks." (Bronfenbrenner, 1977, p. 515).

In short, we are dealing with polyphonic practices that are located and distributed among a multitude of agents, resources and learning opportunities, in which the learner, motivated by an interest, creates opportunities to learn; for example, prolonging a session in the Prado MediaLab by watching a YouTube video, looking for a Pikler text or talking with a teacher familiar with this pedagogical philosophy. In short, and again, the network of these practices and people help to constitute a "learning ecology" understood as an "accessed set of contexts, comprised of configurations of activities, material resources and relationships, found in co-located physical or virtual spaces that provide opportunities for learning" (Barron, 2004, p.6).

Brofenbrenner could not have known that the developments and media technological convergence, could potentially convert any *de facto* microsystem into a mesosystem or a "multi-microsystem" that would end up breaching all sorts of physical, as well as temporary, boundaries. Mobile, wireless devices

allow us to bring the contexts of our lives with us wherever we go (we can communicate with our family, for example, at any time and under any circumstances). Furthermore, not only do they have the potential to bring down some barriers preventing access to information, but they also provide the means and resources needed to create and share cultural content, through social support in online affinity spaces, which has potential links to the horizontal processes of democratization of cultural creation and diffusion (Jenkins, Ito, & boyd, 2016).

In this way, learning takes place as a result of participation in sociocultural practices that are integrated into people's lives. Hence the need to go beyond the notion of cultural context as a fixed container for learning and human development towards metaphors that allow us to account for the (dis)continuities in learning experiences (as illustrated, for example, by the article by Miño, in this issue), and the polyphony of the everyday practices and contexts of life.

In other words, the emphasis is on the *learning trajectories* that take shape as a result of participation and involvement in school and out of school practices. And since it is, in fact, becoming increasingly difficult to separate the in and out of school, there is a need to overcome this dualism and move towards more process-related metaphors such as hybridization ("hybridized intercontextuality" – according to Leander, 2001) and plurality ("polycontextuality" – according to Engeström, Engeström, & Kärkkäinen, 1995).

In the same vein, we find the notion of *connected learning* to better characterize settings of learning than approaches that are confined to a single setting, whether it is a school or an afterschool program. Connected learning is a framework that brings together sociocultural learning theory with perspectives on learning as a cross-setting phenomenon (Dreier, 2008b). It enjoins scholars to consider the ways that interest-related pursuits are supported by others over time through sponsorship and peer feedback, and through supported pathways into academic futures, careers, and civic engagement, as described in Ito et al (2013) and Allen, DiGiacomo, van Horne, & Penuel (in this issue). Similarly, there is the *Learning lives* perspective ("everyday life as a form of pedagogy") which emphasizes a *fluid ontology* or *ontology of life* in place of an *object-oriented ontology* or *ontology of things* (Erstad, 2012; Edwards, 2009; Jornet & Erstad, in this issue, Roth & Jornet, 2018). The *Learning lives* perspective integrates notions such as liquid, fluid, experiences, identities and biographies to redefine the context as a *contexture*, that is, mutually constitutive relations between dynamic transactions between changing persons and symbolic and material culture (Jornet & Roth, 2018). The notion of "chronotope", understood as "space-time configurations [...] socially constructed" (Kumpulainen, Mikkola, & Jaatinen, 2014, page 56) is also considered relevant here. Likewise the

importance of networks and social connections, *brokering* and specifically "sponsorship" understood as the different ways in which people experience brokering-like moments related to their interests, i.e., the role that people have as mentors and connectors of the activities and interests of learners (Allen et al., in this issue). Hernandez-Hernandez et al. (in this issue) prefer the metaphor of "nomadic learning trajectories" which invites us to reflect on the interstices, displacements, unstable journeys, ways of knowing, assemblages and entanglements that occur in the learning trajectories that are portrayed through stories comprising cartography, maps, images, texts and videos (Hernandez-Hernandez; and Miño, both in this issue). Another image that we find relevant, and that also lends itself to the discussion of the static and delimiting nature of context and human learning, is transmedial organization, transmedialization or transcontextuality, understood as the combination of different media at different times for the additive contribution to a unique and shared story (Jenkins, 2006; Molas-Castells & Rodríguez Illera, in this issue).

In short, we think that there are significant contributions underlying all these proposals that force us to resignify classic notions such as setting, practice and learning in the Digital Age, also referred to as the Mobile-Centric Society (Esteban-Guitart, 2015, 2016; Patiño & Esteban-Guitart, 2014) which is characterized by the ubiquitous and distributed penetration of digital media, resources and applications in artefacts present in the everyday lives of people, the most important of which, at present, is the smartphone.

Advancing our understanding of how to promote more equitable learning across settings and time

Finally, we would like to highlight a series of contributions, which complement those previously mentioned, and which represent, in our opinion, interesting approaches regarding the design of inclusive educational architectures.

Elsewhere, following a review of the literature (Penuel, Clark & Bevan, 2016), one of us has proposed five principles for building a resilient ecosystem to promote equitable learning in the areas of science, technology, engineering and mathematics (STEM). We believe such principles can be applied not only to STEM areas, but to any field of knowledge, with the aim of improving learning which, previously, took place exclusively in situated settings such as the classroom. We would emphasize here that these five principles all suggest taking into account the "mobility of learning" (Esteban-Guitart, 2016; Vossoughi, & Gutiérrez, 2014) and the need to establish educational continuities among "contexts" and learning experiences (Bronkhorst, & Akkerman, 2016). These principles, which are amply illustrated in the contributions in this special issue, are as follows:

1) *Draw on values and practices to articulate shared learning goals*. This

idea is related to the *funds of knowledge* approach (González, Moll, & Amanti, 2005; McIntyre, Rosebery, & González, 2001; Llopart, & Esteban-Guitart, 2018) and what has been referred to as *educational contextualization*, that is, connecting teaching and school curricula to the experience and skills found in students' homes and communities (Llopart, & Esteban-Guitart, 2018; Nasir, Rosebery, Warren, & Lee, 2006; Silseth, & Erstad, 2018). There are several examples of this included in this special issue (for example, Cortés et al. and Ramírez et al.) that are based on family practices in which participants share learning objectives, such as taking photographs.

2) *Involve stakeholders in co-design*: This means giving learners, and organisers of different learning settings, the chance to take part in the intervention by designing and participating in the activities of the intervention. For example, the previously mentioned study by González-Patiño (in this issue) involved a group of preschool and kindergarten education professionals from Madrid (from the *Asociación Española de Escuelas Infantiles de Gestión Indirecta*, or AMEIGI); a researcher from the *Universidad Autónoma de Madrid* from the Mediática group, which provides support services for educational communities seeking new ways to employ digital practices; and the City Council of Madrid who provided the facilities of the Medialab-Prado. All of those involved participated in the design of the activities and practices that took place.

3) *Make connections across settings.* This is especially relevant in the context of this special issue. It consists of engaging participants in building stories and producing artefacts across various learning settings, which means they experience learning in various contexts, and with various resources or media. For example, in this special issue Hernández-Hernández et al. describe the visual narratives, or *cartographies*, which become visual artefacts that can produce meaning and significance related to the movements and learning trajectories of teachers in secondary schools in Barcelona. Also in this issue, García-Pastor looks into digital texts of identity produced by learners of English as a foreign language which connect their various English learning experiences and practices from school, family and their private lives across time.

4) *Name Youth as Contributors*. This helps young people to identify with the learning enterprise by supporting and naming them as contributors to 'authentic endeavours'. In authentic endeavours, young people have a say in the aims of the learning activities in one setting – an experience that prepares them for action in another setting. Many of the interventions examined in this special issue (for example, in the

workshops of the *Matadero de Madrid* described by Cortés et al., or in the learning trajectories described by Miño) illustrate the creation of processes involving participants as contributors in which the learner can, driven by their interest and social feedback, make sense of the content and practices in which they participate (Coll, 2016).

5) *Intentionally Broker Learning Across Settings*. *Brokering* refers to helping people move from one setting to another that might otherwise be inaccessible. Brokering expands "know who" – knowing the people or groups who can provide personal or social support or who have knowledge, skills, or resources to share. Brokers help young people navigate educational requirements, bureaucratic procedures, and implicit expectations regarding successful career pathways. Brokering requires "know where" – knowing the networks of people and places where learners can pursue deeper learning, whether in educational settings, work, play, or civic institutions. In this special issue, Levinson and Barron describe how families were provided with a tablet device with curated language and literacy-related content. This helped expand the parents' roles as collaborative learners of English as a second language and supported their co-exploration of other academically relevant topics. The parental role was enriched as it moved towards positions of "teacher", "learner" or "learning broker". Also in this issue, the contribution by Allen et al analyses the conditions of sponsorship in youth learning. As we said earlier, sponsorship is understood as the social processes of linking opportunities, resources and support, on the one hand, with the interests of learners, on the other. What is underscored by this analysis is the importance of social mediation (accompaniment, recognition, and suggestion) in the processes of initiation, development, persistence or change in interests over time.

We invite you to read the different articles brought together in this special issue, which are important contributions to a topic that, we believe, will continue to engage the educational community in the coming years. We hope to contribute to this collective line of work with this special issue, which aims to understand more profoundly how people learn in contemporary scenarios, and how we can develop educational policies that favour inclusion and the enrichment of resources and learning opportunities.

Acknowledgments

References

Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, *81*(2), 132-169. doi: 10.3102/0034654311404435

Azevedo, F. S. (2011). Lines of practice: A practice-centered theory of interest relationships. *Cognition and Instruction*, *29*(2), 147-184. doi: 10.1080/07370008.2011.556834

Barron, B. (2004). Learning Ecologies for Technological Fluency in a Technology-rich Community. *Journal of Educational Computing Research, 31,* 1–37.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human Development*, *49*, 193-224. doi: 10.1159/000094368

Barron, B. (2010). Conceptualizing and tracing learning pathways over time and setting. *National Society for the Study of Education*, *109*(1), 113-127.

Barron, B. & Bell, P. (2015). Learning Environments in and out of School. In L. Corno & E. Anderman (Eds.), *Handbook of Educational Psychology* (pp. 323-336). New York: Routledge.

Bell, P., Tzou, C., Bricker, L. A., & Baines, A. D. (2012). Learning in diversities of structures of social practice: Accounting for how, why, and where people learn science. *Human Development*, *55*, 269–284.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. American Psychologist, *32*(7), 513-530. doi: 10.1037/0003-066X.32.7.513

Bronkhorst, L. H., & Akkerman, S. F. (2016). At the boundary of school: Continuity and dicontinuity in learning across contexts. *Educational Research Review*, *19*, 18-35. doi: 10.1016/jedurev.2016.04.001

Cole, M., & Distributed Literacy Consortium (2006). *The Fifth Dimension: An after-school program built on diversity*. New York, NY: Russell Sage Foundation.

Coll, C. (2013). El currículo escolar en el marco de la nueva ecología del apredizaje. *Aula de Innovación Educativa, 219*, 31-36.

Coll, C. (2016). La personalització de l'aprenentatge escolar. Un repte indefugible. En J. M. Vilalta (Ed.), *Reptes de l'educació a Catalunya. Anuari 2015* (pp. 43-104)*.* Barcelona: Fundació Jaume Bofill.

DiGiacomo, D., Van Steenis, E., Van Horne, K., & Penuel, W. R. (in press). The material and social constitution of interest. *Language, Culture, and Social Interaction*.

Dreier, O. (1999). Personal trajectories of participation across contexts of social practice. *Outlines. Critical Practice Studies*, *1*(1), 1-30.

Dreier, O. (2008a). *Psychotherapy in everyday life*. New York: Cambridge University Press.

Dreier, O. (2008b). Learning in structures of social practice. In K. Nielsen, S. Brinkmann, C. Elmholdt, L. Tanggaard, P. a. Musaeus, & G. Kraft (Eds.), *A qualitative stance: In memory of Steinar Kvale, 1937–2008* (pp. 85-96). Aarhus, Denmark: Aarhus University Press.

Edwards, R. (2009). Introduction: Life as a learning context? In R. Edwards, G. Biesta, & M. Thorpe (Eds.), *Rethinking contexts for learning and teaching. Communities, activities and networks* (pp. 1–13). London, England: Routledge.

Engeström, Y., Engeström, R., & Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction, 5,* 319–336.

Erstad, O. (2012). The learning lives of digital youth—beyond the formal and informal. *Oxford Review of Education, 38*(1), 25–43.

Erstad, O. (2015). Learning lives across educational boundaries: Continuity and discontinuity in learning trajectories. *International Journal for Research on Extended Education*, *3*(2), 9-22. doi: 10.3224/ijree.v3i2.20886

Esteban-Guitart, M. (2015). "The medium is the message": Online learning, communities and identities. *Theory & Psychology*, *35*, 546-548.

Esteban-Guitart, M. (2016). *Funds of identity. Connecting meaningful learning experiences in and out of school*. New York, NY: Cambridge University Press.

Esteban-Guitart, M., Serra, J.M., & Vila, I. (2017). Informationalism and informalization of learnings in 21st century. A qualitative study on meaningful learning experiences. *Social and Education History*, *6*(1), 1-25. doi:10.17583/hse.2017.2111

Gee, J. P. (2005). Semiotic social spaces and Affinity spaces. From the Age of Mythology to today's schools. In D. Barton & K. Tusting (Eds.), *Beyond communities of practice* (pp. 214-232). New York, NY: Cambridge University Press.

Gee, J. P., & Esteban-Guitart, M. (in press). An approach to teach and deep learning.

González, N., Moll, L. C., & Amanti, K. (2005). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates.

González-Patiño, J., & Esteban-Guitard, M. (2014). Some of the Challenges and Experiences of Formal Education in a Mobile-Centric Society (MCS). *Digital Education Review*, *25*, 64-86.

Gutiérrez, K. D., & Rogoff, B. (2003). Cultural ways of learning: Individual traits or repertoires of practice. *Educational Researcher*, *32*(5), 19-25. doi: 10.3102/0013189X032005019

Immordino-Yang, M. H., & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education*, *1*(1), 3-10.

Ito, M., Gutiérrez, K. D., Livingstone, S., Penuel, W. R., Rhodes, J. E., Salen, K., Schor, J., Sefton-Green, J., & Watkins, S. C. (2013). *Connected Learning: An agenda for research and design*. Irvine, CA: Digital Media and Learning Research Hub.

Jenkins, H. (2006). *Convergence culture where old and new media collide.* New York: New York University Press.

Jenkins, H., Ito, M., & Boyd, D. (2016). *Participatory Culture in a Networked Era: a Conversation on Youth, Learning, Commerce, and Politics*. Cambridge, UK: Polity Press.

Jovés, P., Siqués, C., & Esteban-Guitart, M. (2015). The incorporation of funds of knowledge and funds of identity of students and their families into educational practice. A case study from Catalonia, Spain. *Teaching and Teacher Education*, *49*, 68–77. doi: 10.1016/j.tate.2015.03.011

Kumpulainen, K., Mikkola, A., & Jaatinen, A-M. (2014). The chronotopes of technology-mediated creative learning practices in an elementary school community. *Learning, Media and Technology, 39,* 53–74.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York, NY: Cambridge University Press.

Leander, K. M. (2001). "This is our freedom bus going home right now": Producing and hybridizing space time contexts in pedagogical discourse. *Journal of Literacy Research, 33,* 637–679.

Lee, C. D. (2017). Integrating Research on how People Learn and Learning across Settings as a Window of Opportunity to Address Inequality in Educational Processes and Outcomes. *Review of Research in Education*, *41*(1), 88-111. doi: 10.3102/0091732X16689046

Llopart, M., & Esteban-Guitart, M. (2017). Strategies and resources for contextualising the curriculum based on the funds of knowledge approach: A literature review. *The Australian Educational Researcher*, *44*(3), 255-274. doi: 10.1007/s13384-017-0237-8

Llopart, M., & Esteban-Guitart, M. (2018). Funds of knowledge in 21st century societies: Inclusive educational practices for under-presented students. A literature review. *Journal of Curriculum Studies*, *50*(2), 145-161. Doi: 10.1080/00220272.2016.1247913

McIntyre, E., Rosebery, A., & González, N. (2001). *Classroom diversity. Connecting curriculum to students' lives*. Porstmouth, NH: Heinemann.

Nasir, N. S., Rosebery , A. S., Warren, B., & Lee, C. D. (2006). Learning as a cultural process: achieving equity through diversity. In R. K. Sawyer (Ed.), *the Cambridge Handbook of the Learning Sciences* (pp. 489–504). New york, NY: Cambridge University Press.

Penuel, W. R., Clark, T. L., & Bevan, B. (2016). Infrastructures to support equitable STEM learning across settings. *Afterschool Matters*, *24*, 12-20.

Penuel, W. R., DiGiacomo, D. K., Van Horne, K., & Kirshner, B. (2016). A social practice theory of learning and becoming across contexts and time. *Frontline Learning Research*, *4*(4), 30-38. doi: 10.14786/flr.v4i4.205

Penuel, W. R., Bates, L., Pasnik, S., Townsend, E., Gallagher, L. P., Llorente, C., & Hupert, N. (2010). The impact of a media-rich science curriculum on lowincome preschoolers' science talk at home. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the disciplines: Proceedings of the 9th International Conference of the Learning Sciences* (pp. 238–245). Chicago, IL: International Society of the Learning Sciences.

Roth, W-M., & Jornet, A. (2018). From object-oriented to fluid ontology: A case study of the materiality of design work in agile software development. *Computer Supported Cooperative Work, 27,* 37–75.

Silseth, K., & Erstad, O. (2018). Connecting to the outside: Cultural resources teachers use when contextualizing instruction. *Learning, Culture and Social Interaction, 17,* 56-68. doi: 10.1016/j.lcsi.2017.12.002

Subero, D., Vujasinovic, E., & Esteban-Guitart, M. (2017). Mobilising funds of identity in and out of school. *Cambridge Journal of Education*, *47*(2), 247-263.

Subero, D., Llopart, M., Siqués, C., & Esteban-Guitart, M. (2018). The mediation of teaching and learning processes through identity artefacts. A Vygotskian perspective. *Oxford Review of Education*, *44*(2), 156-170. doi: 10.1080/03054985.2017.1352501

Stevens, R., & Penuel, W. R. (2010). *Studying and fostering learning through joint media engagement.* Paper presented at the Principal Investigators Meeting of the National Science Foundation's Science of Learning Centers, Arlington, VA.

Tai, R. H., Liu, C. Q., Maltese, A. V., & Fan, X. (2006). Planning early for careers in science. *Science, 312*, 1143-1144.

Van Horne, K., Van Steenis, E., & DiGiacomo, D. (2016). Disruptions to practice: Understanding suspensions of youths' interest-related activities. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *Proceedings of the 12th International Conference of the Learning Sciences* (Vol. 1, pp. 482-489). Singapore: International Society of the Learning Sciences.

Vossoughi, S., & Gutiérrez, K. D. (2014). Studying Movement Hybridity, and Change: Toward a Multi-sited Sensibility for Research on Learning Across Contexts and Borders. *National Society for the Study of Education*, *113*(2), 603-632.