Review Article

Advancing the conceptualization of learning trajectories: A review of learning across contexts

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ABSTRACT

In contemporary society, school is only one of the contexts in which people learn throughout their lives. Therefore, in recent years studies and conceptual proposals that seek to understand how children and young people learn in different activity contexts have proliferated. In this article we present a systematic review of the recent literature on learning across contexts, and specifically on learning trajectories. The objective is to narrow down and define the notion of learning trajectory by reviewing the existing proposals on the term itself and on other similar concepts, and placing it within the framework of other relevant theoretical and practical constructs. We reviewed 59 articles and book chapters, both theoretical and empirical, in which the concept of learning across contexts is discussed. The results show that personal learning trajectories are conceptualized as a multidimensional and dynamic concept that makes it possible to analyse learning across contexts on two planes: the connections between contexts and activities that occur due to a person's participation in different learning contexts; and the subjective perspective of continuity between the learning experiences that a person reconstructs discursively with other people or with artefacts.

1. Framework

School activities are only one part of a broad set of learning activities in which the learner participates (Banks et al., 2007; Barron, 2006). We are at a time in history when the contexts (cultural centres, libraries, sports clubs, social networks, museums, public spaces, NGOs, virtual communities of interest, etc.) and activities that offer learning opportunities are rapidly diversifying and multiplying. This idea, novel at one time, has been the seed of research approaches that have focused on learning that occurs outside the school (such as informal, situated, authentic or everyday learning), but in a more parallel and independent way from what happens in the formal education system (Bronkhorst & Akkerman, 2016). In the last years, researchers have taken a more integrative step, as there has been a proliferation of research and theoretical approaches that seek to study learning as a fluid and connected process. The emphasis has been placed on the connection and continuity of learning across contexts, considering people's movements through the different spaces in which they participate, as well as the idea that knowledge and skills learned in one context are useful in others (Erstad et al., 2016). Along these lines, research in educational sciences has made an effort to show that learning happens throughout life, between the individual and the community, inside and outside of formal educational contexts.

As the possibilities of learning in different contexts have expanded, some risks have also increased and placed in question whether

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formal education can continue to be an essential instrument for the personal and social development of students. In the most extreme cases, this translates into failure and dropping out of school; however, it is also observed in students who have a good academic record but who are not able to connect what they have learned in school with their daily context, their interests, or their concerns (Coll, 2016, 2018). Furthermore, the distributed nature of learning opportunities in multiple contexts could exacerbate inequalities among students. Although the possibilities of learning at any time and place can enrich the development of learners, these possibilities can also be limited by economic and social barriers to accessing and participating in diverse learning activities (Ito et al., 2020). This, therefore, endangers the principle of equity of current education systems (United Nations, 2015; United Nations, 2020). In this scenario, if we consider that learning is the result of participation in practices that are integrated into people's lives (Esteban-Guitart et al., 2018), it is essential that the education system is capable of assessing and understanding that people learn and participate in different contexts and that these contexts are a source of resources and crucial learning opportunities for safeguarding equity in access to education (Bronkhorst & Akkerman, 2016; Ito et al., 2020; Pinkard, 2019).

The reviews of empirical works by Bronkhorst and Akkerman (2016) and Rajala et al. (2016) presented interesting contributions to understand the connections that are established between different contexts. While Bronkhorst & Akkerman's work puts the focus on understanding continuity and discontinuity within and outside school; Rajala et al. (2016) show some pedagogical strategies to
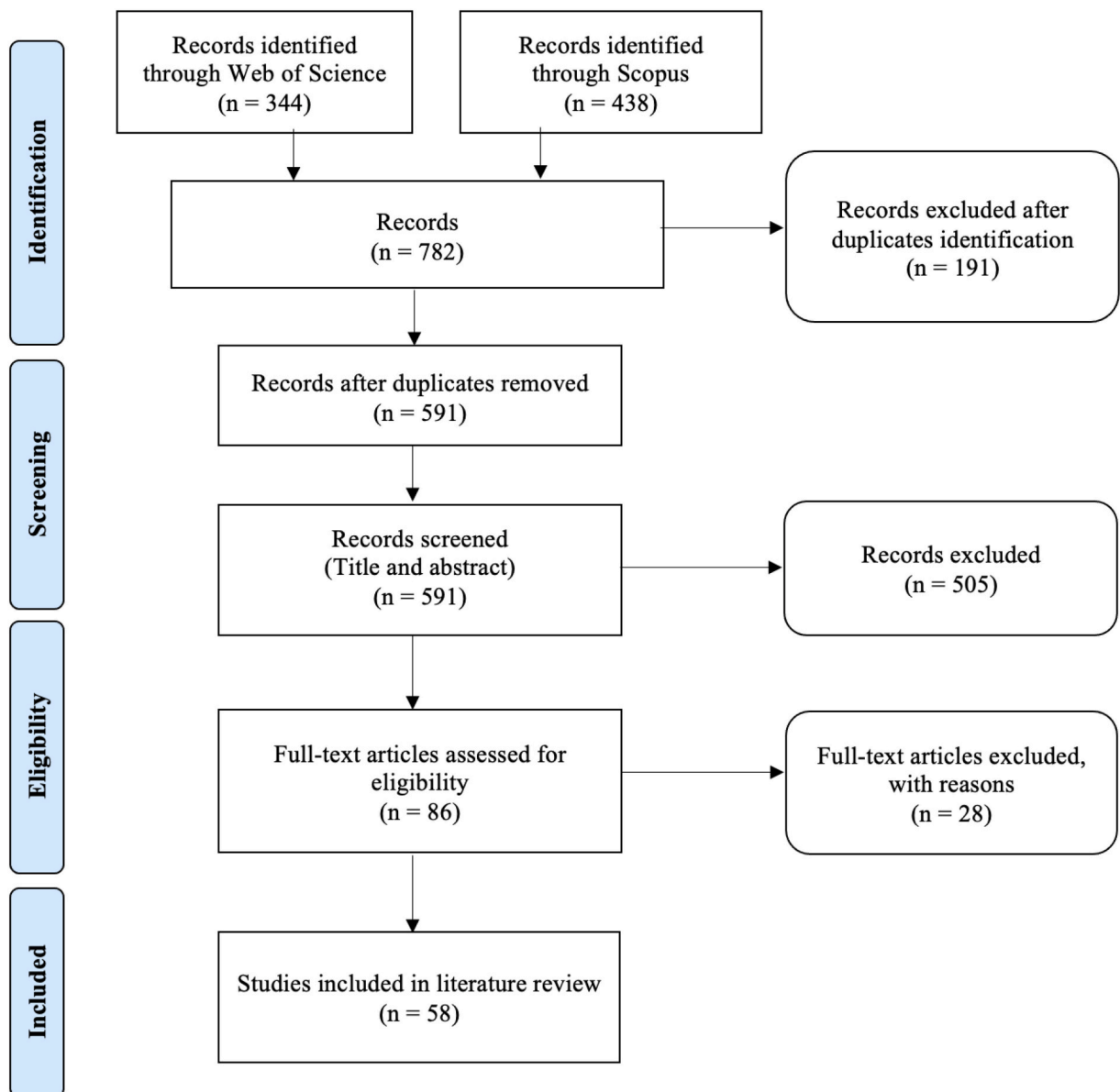

Fig. 1. PRISMA flow diagram
Note: Adapted from Moher et al. (2009).

connect in- and out-of-school. In both cases, we can observe that there are several approaches to learning across contexts that have contributed to a better understanding of learning as a fluid and connected phenomenon across time and space. Some examples can be seen in the proposals of *lifelong learning* (Edwards, 2000; Field & Leicester, 2000; Jarvis, 2009); *learning ecology* (Barron, 2006, 2010); *boundary crossing* (Akkerman & Bakker, 2011; Engeström et al., 1995;) and; *connected learning* (Ito et al., 2013, 2020; Livingstone & Sefton-Green, 2016). These theoretical and empirical approaches to the study of cross-context learning are mostly focused on the connections made in in-school and out-of-school contexts, emphasizing the socio-institutional and physical character of access and participation. However, the diversity of study focuses, areas and levels translates into a multiplicity of theoretical concepts that, despite appearing very similar, involve different assumptions and emphases. From our perspective, the concept of learning trajectory or learning pathway (Leander et al., 2010), which is frequently mentioned in different studies or perspectives, has the potential to integrate the main ideas and characteristics about learning across contexts. All of these approaches agree that learning that happens in a specific space-time is inseparable from learning in other space-times, therefore, it becomes necessary to study learning across time and space. In this sense, as proposed by Esteban-Guitart et al. (2018), p.9) "the emphasis is on the learning trajectories that take shape as a result of participation and involvement in school and out of school practices".

While we note a tendency to understand learning trajectories as trajectories of participation through different contexts (Barron, 2006; Lave & Wenger, 1991; Dreier, 1999; 2003), we agree that the concept of learning trajectories is understood and used in different ways. For example, we note that there are some works that propose an interesting perspective on trajectories, approaching them as narrative and subjective constructions. An example of this perspective is the work proposed around the concept of learning lives (Biesta, 2008; Erstad et al., 2009; Erstad, 2015). As Erstad et al. (2009) say, "to understand learning lives as they are developing requires examining how the individual learner relates to other people and objects, drawing on deeper trajectories or narratives of the self as it exists within and outside the immediate learning contexts" (p. 100). This kind of approach, at some point more distant to the concepts mentioned above, evidences that there are different perspectives on the phenomenon of learning trajectories that should be reviewed and probably could be integrated or complemented.

In this review, our intention is to elucidate a conceptualization of learning trajectories as a sociomaterial and psychological artefact, where learning is mobile, interconnected and distributed in multiple contexts throughout life (Barron, 2010; Bricker & Bell, 2014; Coll, 2009, 2013; Edwards & Mackenzie, 2005; Erstad, 2015; Erstad et al., 2016; González-Patiño & Esteban-Guitart, 2014; Leander et al., 2010).

2. Aim

In this article we carry out a systematic bibliographic review around the concept of learning trajectories and learning pathways to identify the key elements for beginning to develop an understanding of current learning trajectories as a construct that reflects the nature and characteristics of learning across contexts. In order not to disregard proposals related to learning trajectories that could help us in this aim, we have included in our review an exploration of the works on *learning across contexts* or *learning across settings*. In addition, we focused the work on the most recent studies on the subject to learn the developments that have been made since the last reviews on learning across contexts in the scientific literature. In order to achieve the aim of our work, we set two objectives:

a) To examine the conceptualization made around the notions of learning trajectories/pathways or learning across contexts/settings.
b) To explore other theoretical constructs associated with learning across contexts in the literature and connect them with the notion of learning trajectories.

3. Method

The PRISMA workflow was used for searching, selecting, and systematically reviewing the literature on learning across contexts (Moher et al., 2009) (see Fig. 1). At the beginning of the review process, we narrowed the search to empirical articles, review articles and book chapters written in English and published between January 2015 and January 2020. Our aim was to establish continuity with the work already carried out by Bronkhorst and Akkerman (2016). We searched for the terms "learning across contexts" OR "learning across settings" and "learning pathways" OR "learning trajectories" in the *Web of Science* and *Scopus* databases. The searches yielded 782 documents, which became 591 documents after removing the duplicates. First, we made a database in which we identified: author (s), year, title, journal and abstract. In order to guarantee the validity of the study and avoid researcher bias, we divided into pairs and reviewed the titles and abstracts, filtering the articles according to the inclusion criteria. The following are the inclusion criteria, which were previously established based on the literature and the objectives of the review: (a) that the article dealt with learning in more than one context, and (b) that it was based on a sociocultural or historical-cultural perspective of learning. We have limited the works to those that are based on (or are compatible with) a historical-cultural perspective for two reasons. First, to exclude the studies that use the term "learning trajectory" in other scientific disciplines and that does not correspond to cross-context learning. Second, to be able to elaborate a coherent proposal at ontological, epistemological and theoretical levels. In the case of doubt or disagreement between researchers, the full text was read and discussed as a group. After this review, 526 documents were excluded, and we were therefore left with 86 documents. Second, also in working pairs, we analysed the full text in depth, identifying the following characteristics: (a) type of document; (b) conceptualization of learning across contexts or learning trajectories; (c) educational stage; (d) learning contexts; and (e) learning content. After this second review, 28 articles were excluded, either because they did not meet the inclusion criteria or because the full text could not be retrieved, even when we contacted the first author. Our analysis therefore included 58 documents, which can be seen in the Appendix. To achieve the objectives set out in this work, the analysis focused on two aspects: on the one hand,

on the definitions and theoretical approaches to learning trajectories and/or learning across contexts; and on the other hand, on those concepts that were repeated most frequently in the reviewed texts and that were relevant for going deeper into the phenomenon of learning trajectories.

4. Results

We have divided the results into three sections. In the first section, we present the basic information of all the studies included in the review and describe some of their most relevant characteristics. In the second section, we present the main ideas found in the theoretical frameworks and the results of the reviewed articles, including those referring to learning trajectories and learning pathways and those referring to other terms used to conceptualize learning across contexts. In the third section, we review four concepts that will allow a better understanding of learning trajectories: *identity, agency* and *interest*.

4.1. Description of the included studies

Table 1 (See Appendix A) provides the list of the 58 works examined in the review and summarizes their main characteristics: what concept or concepts they use to talk about learning across contexts, the educational or life stage they focus on (in the case of empirical studies), the learning contexts they include, and the theme or main object of interest of the work. For each of these aspects, we have established categories that allow us to compare and group the articles in order to make a first general description of the set of works.

The first observation we can make regarding this group of works is that, when we look at the publication dates, we see that the number of articles in which learning is approached through contexts has been increased because more than half of the articles from the search results are concentrated in 2018 and 2019. In addition, few authors are repeated or appear in more than one work, which shows breadth and variety in the approaches. These two facts reflect that interest in the subject has not only waned since the last published reviews, but that it seems to be on the rise.

Of the 58 papers included, 10 of them are theoretical or review articles, while the rest present data from empirical studies. Regarding the concept that studies use to refer to learning across contexts, we observed that 29 articles explicitly mention learning trajectories or learning pathways. The rest of the works either discuss learning across contexts in general, or they adopt a specific approach, such as *boundary crossing, seamless learning* or, to a lesser extent, *learning ecologies, connected learning, learning lives* and *lifelong learning*. However, we have not detected new proposals for conceptualizing the phenomenon that were not present in previous reviews. These results are discussed in detail in the following sections.

Regarding empirical articles, we found studies that focus on a wide range of different educational stages, ranging from preschool to adult education. However, studies on professional development during adulthood (14) and secondary education (13 in total) predominate, followed by studies on higher education (12). Special mention should be made of teacher training studies, which make up a large part of the works that study higher education. In the rest of the studies, reference is made to vocational training, primary education, preschool, or it is not specified.

When it comes to learning across contexts, we also see a certain variety in the type of contexts that are included. Undoubtedly, most of the works have the formal educational context as their point of reference, be it primary school, high school or university (44). There are also many articles that explore learning outside of school, although a specific context is not mentioned, and it is often linked to school learning. Also noteworthy are the works that address the relationship between school contexts and the labour context. Others also mention virtual learning contexts.

Finally, the works cover multiple topics and learning content, among which the learning of specific competences (related to art, science, language and sport), the use of digital technologies and the development of psychological processes, such as identity or interests, stand out. Several works also deal with the learning of professional skills, while others focus on more social aspects, such as migration. There are also some non-empirical studies that focus on presenting a conceptual approach to learning across contexts, especially in relation to seamless learning and boundary crossing.

4.2. Defining learning trajectories

The studies reviewed that use the concept of *trajectory* or *pathway* refer to the set of activities and socio-institutional contexts in which a person participates and learns. We have not identified relevant differences between the studies that use the term learning pathways (for example, Akiva et al., 2017; Bell et al., 2018; Douglas et al., 2018) and those that opt for learning trajectories (for example, Hernández-Hernández et al., 2018; Miño-Puigcercós, 2018; Silseth & Erstad, 2018), since both are used in a broad sense to refer to learning across contexts. Although this underlying idea can be deduced in practically all works, few articles explicitly define what they understand by a learning trajectory/pathway. Usually, this notion is obviated because it is not the main focus of the work. In the articles reviewed that do not explicitly use the term "trajectory" or "pathway", the concept *learning across contexts* is frequently used as a general idea to indicate that learning happens in more than one context and that connections, continuities and discontinuities can be established. In both type of studies (those who use the term trajectory and those who do not), we have identified five main features of the process of learning across contexts that are explained in the following sections.

4.2.1. Participation and situated learning

In the cases in which some type of definition or conceptualization of the trajectories is explicitly offered, the studies are based on a situated approach to learning. A learning trajectory, from this point of view, is generated and transformed through people's

participation in multiple social practices, both educational and non-educational. The definition of trajectories emphasizes notions such as *participation*, *social practice* and *community of practice*, which is evident in the many citations to the works of Dreier (1999, 2003, 2009), Wenger (1998) and Lave and Wenger (1991) in various reviewed studies (for example, Esteban-Guitart et al., 2018; Kumpulainen, 2016; Miño-Puigcercós, 2018; Silseth & Erstad, 2018; Stromholt & Bell, 2018). It is also linked to *legitimate peripheral participation*, understood as the journey of a newcomer to a community of practice from their initial participation towards full participation (for example, Alenius, 2016; Rintala & Nokelainen, 2020; Veillard, 2015). This gives a temporal nuance to the idea of trajectory, which not only implies mobility in different contexts, but also the participation and development of skills in multiple practices over time (Kobayashi, 2016).

Related with the previous idea, the concept of *lifelong learning* (Douglas et al., 2018; Green & Portelli, 2018; Kangas & Ukkonen-Mikkola, 2019; Tsatsaroni & Sarakinioti, 2018) is used to highlight the need for constant learning to adapt to social changes that take place at any situation and at any time in life. All the studies are empirical and focus on very diverse populations and topics, such as early childhood education (Kangas & Ukkonen-Mikkola, 2019), young people learning about sustainability (Green & Portelli, 2018) or the professional development of Paralympic coaches (Douglas et al., 2018). In short, there seems to be a consensus among the studies reviewed that the trajectories imply participation in diverse communities of practice as well as a temporal evolution.

4.2.2. Specific and general trajectories

In the reviewed studies, we have seen that learning trajectory can be also understood as a specific trajectory, related to a certain type of learning content (music, sport, work language, etc.) or context (school, work, etc.), or as a general trajectory, that includes whatever kind of learning content or contexts.

In the first group of works, trajectories often refer to a specific learning context or field of knowledge, for example *language-learning trajectory* (Cabot, 2016; Han et al., 2019; Tasker, 2017). Also, we can see studies in which trajectories are only related to learning that comes from interest and choices, so they are what we could call *interest-driven* trajectories. For example, Akiva et al. (2017) talk about *interest-based learning pathways* and limit the meaning of the trajectory to the learners' participation in practices that are interesting for them and in which they can learn, such as hobbies. Another example could be an empirical study on connected learning that show a learning trajectory in a specific area as *cosplay* (Bender & Peppler, 2019). Learning trajectories can also be limited to certain *academic or professional trajectories*, such as being a sports *coach* (Brasil et al., 2018; Douglas et al., 2018) or a teacher (Hernández-Hernández et al., 2018; van der Rijst et al., 2019; Veliz & Véliz-Campos, 2019). Finally, Virkus (2019) and Rintala and Nokelainen (2020) use the term trajectory to refer specifically to the path that a student can choose in an education plan based on their goals, interests or other preferences. In the second group of works (for example, Esteban-Guitart et al., 2018; Kumpulainen, 2016; Miño-Puigcercós, 2018; Silseth & Erstad, 2018), the term trajectories are used in a broad sense, including all types of learning contexts and learning content, even learning resulting from practices which its aim is not to learn.

In our view, both approaches can be legitimate and useful. The former, because they allow for a more thorough analysis, and allow the concept of learning trajectories to be applied to different areas of study and interest. The last, because they make visible that learning across contexts is not limited to one kind of learning content (such as language or professional development) or context (as academic settings). In conclusion, we can say that the construct can be concretised in multiple ways, referring to broad or specific trajectories, and regarding different learning content.

4.2.3. (Dis)continuity across contexts and activities

The third feature of the learning trajectory is that implies relations established between different contexts and activities where people learn. Several reviewed proposals (e. g. Akiva et al., 2017; Bender & Peppler, 2019; Cabot, 2016; Heccht et al., 2019; Tasker, 2017; Van den Beemt & Diepstraten, 2018) reference Bronfenbrenner (1979, 2005) and Barron (2006, 2010) to expose an ecological perspective and mention the notion of learning ecology. Learning ecologies are understood as the set of physical and virtual contexts that offer opportunities to learn. Despite the great potential of the concept to describe a context and its learning potential, the metaphor of ecology seems to refer more to the opportunities and resources found in the learner's context than to the learner's own movement or trajectory.

Similarly, studies from the boundary crossing perspective (Arts & Bronkhorst, 2019; Bronkhorst & Akkerman, 2016; Wang, 2020), based on Akkerman and Bakker (2011), point out that learning is a process that involves continuities and discontinuities between domains of life and social spaces where different meanings and social practices operate (Van den Beemt & Diepstraten, 2018).The emphasis is usually placed on the idea of the border and on the intentional search to establish relationships of continuity between the different social practices, and to avoid the risk of fragmentation that can occur due to the different experiences that learners have in different contexts (Dilger et al., 2019; Sharples, 2015). Therefore, the focus of this learning trajectories is in the connections established between settings and activities. (e. g. Arts & Bronkhorst, 2019; Harrison, 2018; Holden, 2016; Van den Beemt & Diepstraten, 2018, Wang, 2020).

4.2.4. The subjective experience of learners

As just mentioned, the study of learning across contexts implies (dis)continuities across contexts and activities (Bronkhorst & Akkerman, 2016). However, in some studies, we observe a particular emphasis on the learner's perspective, that is, on understanding the trajectory not only as the participation of a person in connected activities and settings that makes them learn, but also as the experience they have of their own participation, their learning and the continuities and discontinuities of learning experiences across contexts (Alenius, 2016; Bronkhorst & Akkerman, 2016; Dilger et al., 2019). This is especially important from the point of view of establishing connections as we mention in the previous section, since, although there may be some continuities between contexts, these

are not always *self-evident* for the learner, who may experience a fragmentation of their learning. For example, a school activity could be related to some out-of-school context and the teacher could make this more or less explicit, and still the learner could not be able to make the connection. The subjective experience of the learner is therefore decisive for the integration of the different learning experiences along a trajectory.

In this regard, three works delve into learning experiences and trajectories from the learner's perspective. First, Mehmeti and Zittoun (2019) talk about *spheres of experiences* "to designate, on the side of people's lifeworld (Lewin, 1936), patterns of activities, feeling and relationships recurrent enough for people to know that it is 'the same' situation, even though they undergo some variations" (p.180). In these works, we can see that the experience is not limited only by the characteristics and patterns of the activity, but by elements of the personal and subjective experience of each one. According to the authors, the experience of continuity or discontinuity between experiences in different contexts is not given a priori nor can it be defined from the perspective of a third party, because, as Kumpulainen (2016) points out, the activity context is defined discursively in the interaction. In Engel et al. (2019), we proposed the term *subjective learning experience* to refer to the discursive and conscious reconstruction of the experience of participation in a given situation that results in learning. Here, the experience is not limited to the learner's perspective on the learning situation, but rather to a higher level of reflection, where it is converted into meaning through awareness and discourse. Finally, Van den Beemt and Diepstraten (2018) talk about *narratives of life experiences* to highlight that the narrative gives shape to the learning ecology of the learner, showing their social relationships and their forms of participation. According to the authors, to understand the experiences of learners in non-school contexts, it is necessary to explore whether they identify them as learning experiences in the first place.

Similarly, the notion of *seamless learning* used in some studies (e.g.Dilger et al., 2019 ; Sharples, 2015 ; Wong & Looi, 2018) also gives importance to how a person experiences continuity in learning and establishes conscious connections across multiple time scales, social environments and with extensive use of technologies as a form of mediation (Voon et al., 2019; Wong & Looi, 2018). According to Sharples et al. (2015), children have to be conscious that learning happen at any time and place and also that what is learned in one context can be applied easily in another. It is therefore important that students are able to manage by themselves the changes between contexts and be able to integrate their diverse experiences (Dilger et al., 2019). But, although continuity in learning across contexts can be self-managed, teacher's play an important role in preparing students to learn the necessary tools that will allow them to create meaning as well as reflect and make connections between what happens inside and outside the classroom and over time to enhance their learning process (Dilger et al., 2019; Sharples, 2015; Toh et al., 2017).

4.2.5. The role of digital technologies

Finally, the importance of digital technologies arose in several reviewed studies and perspectives, such as *boundary crossing* (Arts & Bronkhorst, 2019) or *seamless learning* (Wong & Looi, 2018) that work on the *m-learning* concept and its practical manifestation on school activities. There is a large tendency to use mobile technologies or digital media as tools that allow learning more and better. On the one hand, they increase the opportunities to participate in different learning activities, diversifying the range of interests and establishing links with other people who share these interests (Bender & Peppler, 2019; Maul et al., 2016). On the other hand, they make it possible to research and explore different information sources and connect what happens in the classroom with other spaces (Dilger et al., 2019; Sharples, 2015; Wong & Looi, 2018). These ideas only confirm that digital technologies and media are an essential element in establishing connections and building learning trajectories.

4.3. Broadening the focus: The notions of identity, interest and agency

In addition to the five characteristics or ideas we have just highlighted about learning trajectories, we have found three concepts that are closely related to this construct and that can help us to understand them: identity, interest and agency. In our point of view, these three concepts remark the importance of the subjective perspective of the learner and how it influence the participation across contexts and activities.

In this review, references to the term *identity* were common related to the idea of the learning across contexts. Although different authors agree on its relevance, there is a wide diversity in the treatment given to this concept. We found that some studies talk about general identity, while others focus on identities related to specific areas, such as the identity of a coach (Brasil et al., 2018), identity of a filmmaker (Gilje & Groeng, 2015), professional identity (Pimmer, 2016), or learner identity, either in relation to science (Stromholt & Bell, 2018) or language (Veliz & Véliz-Campos, 2019). Despite this diversity, most studies share the dynamic and situated character of identity, which is inseparable from social practice and the reference community (for example, Kumpulainen, 2016; Van den Beemt & Diepstraten, 2018).

A definition that helps us to order the general approach of these studies to the relationship between identity and learning is that of Pimmer (2016), who says that identity "is both a result and at the same time an enabler of learning across boundaries" (p.985). Identity as an *enabler* stands out as a generator of the individual's participation trajectory. It is an individual's identity that allows them to understand their relationship with the world and with their future possibilities (Veliz & Véliz-Campos, 2019), and which serves as a vehicle for experiences from one context to another (Pimmer, 2016). Identity is also highlighted as a *result*, as an *output* of people's trajectory of participation. The diversity of activities in which individuals participate and learn has an impact on the development of a person's identity (Wang, 2020), and reflecting on one's own learning encourages the construction of new identities (Akkerman & Bakker, 2011, cited in Pimmer, 2016) over time and in different spaces at the same time (Akkerman & Bakker, 2019; Wang, 2020).

As we have previously pointed out when we walk about the specific trajectories, the review carried out has also made possible to identify the close relationship between learning through different contexts and learners' *interests* (Akiva et al., 2017; Akkerman & Bakker, 2019; Bender & Peppler, 2019; Bronkhorst & Akkerman, 2016; Esteban-Guitart et al., 2018; Heccht et al., 2019; Maul et al.,

2016; Peppler & Keune, 2019; Rappa & Tang, 2017). In general, interests are understood as the feeling of attraction or *engagement* towards a certain object, such as an activity, a theme or a phenomenon. There can be a variety of elements capable of awakening and maintaining a learner's interest, such as the media, conversations, peer feedback or experiences in any context. For example, Heccht et al. (2019) study the development of the interest in science and nature of a group of adults, while Van den Beemt and Diepstraten (2018) study teachers' relationship with ICT as well as their interest in it. In both cases, the idea of interest is fundamental for the construction of a person's learning ecology, and the relevance of non-formal social spaces is highlighted even in the adult stage. In addition, interests are not unique, but multiple, and can develop in and through different contexts, maintained thanks to different kinds of social and cultural supports (Akkerman & Bakker, 2019; Maul et al., 2016).

Along these lines, the studies show that interest usually translates into the preference for participation in certain activities and contexts (Esteban-Guitart et al., 2018). Interests are closely related to agency, since individuals orient their participation towards these contexts that offer them learning opportunities related to their interests, building interest-based learning trajectories (Akiva et al., 2017), or building *pursuits of interest* (Maul et al., 2016). When a learning interest emerges in a context, in a situational way, but develops and begins to generate new learning opportunities in new contexts, a personal interest can be triggered (Heccht et al., 2019). In this regard, from boundary crossing perspective, the maintenance and development of interests allows border crossing among different contexts (Akkerman & Bakker, 2019).

Lastly, some of the articles reviewed referred to the concept of *agency* as one of the relevant, and even necessary, conditions for learning across contexts. Although there is no clear agreement regarding the use of the concept and its theorization, and it is recognized as a multifaceted term that corresponds to different perspectives, it is generally used with a particular focus on the learner's capacity for action and choice in orientating their own learning trajectories (Cabot, 2016; Rappa & Tang, 2017; Rintala & Nokelainen, 2020). The works do coincide in pointing out that agency, more than an individual capacity, is generated in the transaction of a particular situation, and is mediated by other artefacts and people in the context. Beyond these considerations, agency is treated very differently in the various works, and corresponds to very different purposes, such as for analysing the active participation of a person across contexts (Cabot, 2016), observing the relationships that a subject is constructing and re-constructing through time and space (Rappa & Tang, 2017), or for highlighting the importance of teachers recognizing students as active and responsible protagonists in the construction of knowledge (Wiig et al., 2017).

5. Discussion

From the literature review, we have found some common and core ideas to move towards a richer conceptualization of the concept of learning trajectories. We present these ideas in the following three subsections.

5.1. Participation and subjective experience. Bringing two perspectives closer

Talking about *learning trajectories* implies understanding learning as a process that occurs thanks to situated participation in certain social practices (Dreier, 1999, 2003; Lave & Wenger, 1991). One of the fundamental aspects for the construction of new knowledge and skills seems to be direct interaction in different activities with other people and cultural artefacts belonging to a community of practice, with a series of objectives and norms that organize social participation. However, learning is not considered to be a complete or finished result in each of these practices and communities, but rather it occurs continuously through multiple and diverse activity contexts. Conceptualizing learning as a trajectory means understanding it as a fluid process that extends to the different contexts through which the learner moves, at least in two directions. On the one hand, a learning trajectory has a synchronous dimension, since it refers to the mobility of learners between different activities or contexts at a given time, as evidenced by studies on learning ecologies (Akiva et al., 2017; Bender & Peppler, 2019; Cabot, 2016; Hecht et al., 2019; Tasker, 2017; Van den Beemt & Diepstraten, 2018) or connected learning (Ito et al., 2020; Livingstone & Sefton-Green, 2016). A trajectory also has a diachronic dimension, since it considers the evolutionary nature of learning over time, as emphasized by the lifelong learning approach (Douglas et al., 2018; Green & Portelli, 2018; Kangas & Ukkonen-Mikkola, 2019; Tsatsaroni & Sarakinioti, 2018).

However, despite sharing these general characteristics, in the literature has not been mentioned that there are at least two types of approaches to the study of learning trajectories. The studies reviewed have allowed us to differentiate these two approaches which, taken together, help us to rethink what learning trajectories are.

On the one hand, there is the approach to learning trajectories from the point of view of access and participation in multiple activities and socio-institutional contexts that offer opportunities to learn, as well as the relationships of continuity and discontinuity that occur between these activities and contexts (e.g. Bender & Peppler, 2019; Brasil et al., 2018). Based on this type of approach, it is important to map the learning opportunities available in the community environment, the facilities and obstacles to accessing and using these opportunities (e.g. Akiva et al., 2017; Stromholt & Bell, 2018), and also the mechanisms that arise in the design of learning activities and environments to generate connections between different contexts and learning objects (Oller et al., 2021).

On the other hand, there is the approach related to the subjective experience and conscious reconstruction) that a learner can make of their learning across contexts based on the experiences they have had in the different activities in which they have participated (Engel et al., 2019; Bronkhorst & Akkerman, 2016). This approach emphasizes the learner's experience of continuity, understanding that learning experiences not only occur through multiple connected contexts, but can also be reconstructed discursively and re-signified, becoming a psychological artefact that makes it possible to generate new learning. Most of the papers reviewed discuss the importance of considering connections in learning from the idiosyncratic perspective of the learner (e.g. Alenius, 2016; Engel et al., 2019; Bronkhorst & Akkerman, 2016; Dilger et al., 2019; Kumpulainen, 2016). This background, which is more focused on the

learner's subjectivity, is especially interesting from the point of view of psychological research and intervention. The notion of subjective learning experience (Engel et al., 2019; Oller et al., 2021), understood as the discursive and conscious re-construction carried out by learners of the learning they do in one or more situations, acquires a new nuance within the framework of trajectories. The connections between experiences can be reflected on and established through discourse and narrative. Thus, when someone reconstructs their subjective learning experiences, with or without the help of other people or artefacts, they have a new opportunity to connect and give meaning, to re-signify the learning achieved in different contexts and activities. In this approach, the trajectories would not only be connections between learning and activity contexts, but discursive and conscious connections between subjective learning experiences that refer to a wide variety of participation contexts.

In conclusion, from our point of view, therefore, both focuses are necessary to understand learning across contexts, and, in fact, constitute two connected and inseparable planes of the process of constructing personal learning trajectories. The first plane would have a more direct relationship with the trajectory of participation, either in face-to-face or virtual activities, emphasizing the connections that the characteristics and socio-institutional context and the activity make possible. The second plane, however, would focus more on the learner's subjective perspective and their experience of continuity between learning situations experienced in the different contexts in which they have participated. Considering the two focuses and how they combine and complement each other is both a challenge and a potential advance in understanding learning across contexts that emerge from our review.

5.2. Identity, interest and agency across settings

The review carried out has also allowed us to deepen the relationship between learning trajectories and other concepts such as identity, interest and agency.

The relationship between identity and trajectories shows us that a trajectory is a generator of identity and vice versa. People learn and construct who they are through their participation in different contexts distributed in time and space. Even on the subjective plane, a person develops their identity by reconstructing personal subjective learning experiences, their meanings and interrelationships. In short, we can say that personal learning trajectories, in their two planes, are also trajectories of identity construction (Pimmer, 2016; Wang, 2020). At the same time, the identity characteristics of each learner influence the contexts in which they choose to participate, opening new opportunities for learning (Pimmer, 2016).

Something similar happens with interest. Interests are a transversal phenomenon linked to different practices, as they are generated and sustained through participation in different contexts of the learning trajectory (Akiva et al., 2017; Akkerman & Bakker, 2019; Heecht et al., 2019; Maul et al., 2016). In addition, as with learning about the world and about oneself, interests can be transformed in the process of discursive reconstruction of personal trajectories. However, interests guide and condition the learner's choice of activities in which to participate, and even mediate the subject's own participation and transform joint activities.

Thus, interests play a decisive role in the learner's capacity for agency, understood as the control they have over their actions, and specifically over the search, choice and creation of learning opportunities (Wiig et al., 2017). This control, however, is not a static or individual capacity, but rather is generated in the activity based on certain restrictions or facilitators of the available environments, actors and resources (Cabot, 2016; Rappa & Tang, 2017; Rintala & Nokelainen, 2020). In short, the review evidences a conception of agency and identity as dynamic and socio-culturally mediated dispositions, through which learners construct their learning trajectories (Kumpulainen & Rajala, 2017; Rajala et al., 2016). At the same time, it also highlights interest as a fundamental element in the construction of the learner's identity, in the deployment of their agency and, therefore, in the configuration of their personal learning trajectories.

5.3. Supporting and scaffolding learning trajectories

The understanding of learning trajectories that we have been able to conceptualize from the review leads us to rethink the way in which we can act on learners' personal learning trajectories. In order to help build trajectories that are richer and to avoid the risk of inequality, different actors can support and scaffold learning trajectories at the two planes mentioned above: facilitating access and participation in different and connected activity contexts and supporting the process of continuity and subjective re-co-construction of learning experiences.

First, it is central to recognise learners as active people, who can develop the skills needed to engage with their own learning environment and process. Secondly, it is necessary to bear in mind that, especially in the first stages, learners will need the support and guidance of more capable others. In schools, teachers play a fundamental role in guiding the construction of personal learning trajectories in two ways. First, by facilitating that students can participate in connected contexts and activities inside and outside the school, considering that different contexts are a source of resources and learning opportunities crucial to safeguarding equity in access to education (Bronkhorst & Akkerman, 2016; Pinkard, 2019). And second, by promoting reflection as a mediating process (Daalsgaard, 2020) in the co-re-construction of subjective learning experiences to facilitate the continuity in the experience of the learners.

It is worth evaluating the mediating power of digital technologies as tools that enhance learning across contexts. Digital technologies make it possible to extend the range of activity contexts, as proposed, for example, by the connected learning and learning ecologies approaches. They also favour the experience of learning continuity, for example, with the use of mobile phones in different contexts. In addition, they can influence how learners identify themselves as learners as they participate, acquire skills and become active members of communities to which they would not otherwise have access (So et al., 2015; Toh et al., 2017; Wong & Looi, 2018).

6. Conclusion and future research

The systematic analysis of the articles published in the period 2015–2020 has allowed us to determine the state-of-the-art and progress in the theoretical knowledge about learning trajectories as a key concept for understanding learning across contexts. Despite the breadth and variability present in the literature in terms of study focuses, themes and theoretical approaches, a more detailed analysis of the conceptual proposals of the reviewed works has led us to determine common elements and relevant aspects, and consequently to establish a more precise conceptualization of learning trajectories and their characteristics.

One of the most salient ideas that emerges from the review is the consideration of personal learning trajectories as an integration of two different but interrelated levels of learning across contexts: the plane of participation and continuities across contexts and activities, and the plane of subjective learning experiences linked to that participation. In addition, learning trajectories are closely related to identity, agency, and interests. We can consider that identity and interest are phenomena that are constructed in the personal learning trajectory, both in people's participation in diverse activities and also in the subjective reconstruction of learning experiences. At the same time, they are phenomena that mediate the learner's agency and promote the construction of trajectories. From a sociocultural approach, the role of other actors is highlighted in supporting and scaffolding the construction of personal learning trajectories, increasing and promoting the flow of connections between activities and learning contexts and facilitating continuity across the learner's subjective experiences.

This systematic review has a robust design and reports the findings in a transparent way, synthesizing the results and conclusions about personal learning trajectories. However, like any study of this kind it has limitations. The most significant is related to the fact that incorporating other search terms or inclusion/exclusion criteria could have allowed us to include other useful studies that could contribute to our knowledge and understanding of learning across contexts. Therefore, future research will need to go deeper into the conceptualization of learning across contexts and not limit the search to indexed articles, or use other terms, such as, for example, *wildfire activities* (Engeström, 2009) or *third space learning* (Gutiérrez et al., 1999; Moje et al., 2004). However, the broad, general and connecting vision that we have tried to maintain in this work has allowed us to highlight some features of personal learning trajectories that advance the understanding of learning across contexts and are very relevant for educational policies and practices.

As we mentioned initially, in a historical moment in which opportunities for participation are becoming increasingly diversified in multiple contexts, in societies with large inequalities, we consider that the personal learning trajectory can be a key concept on which to base an education action capable of contributing to the challenge of promoting fairer and more equitable societies. In this scenario, the school is a core institution for assessing and establishing actions so that participation in diverse contexts is used as a source of resources and learning opportunities for all students (Ito et al., 2020).

The school can play a relevant role in both defining planes of learning trajectories: (dis)continuities across settings and activities, and (dis)continuities in the subjective experience of the learner. On the one hand, facilitating programmes and alliances between teachers, learners, families, local contexts and digital environments, among others, to support together the construction of personal learning trajectories (Erstad et al., 2021) that help all learners to become increasingly more competent in contemporary society. On the other hand, planning teaching that contributes to developing students' experience of continuity, with activities that promote the ability to reflect on their experiences in different contexts, establish connection and support the construction of more empowering learning trajectories.

Statement

We confirm that this original manuscript has not been published and is not under consideration for publication by another journal.

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Declaration of competing interest

None.

Data availability

No data was used for the research described in the article.

Appendix A. Overview of the selected articles

Table 1
Overview of the selected articles.

N	Author	Type of document	Concept(s)	Educational stages	Learning contexts	Main topic(s) and learning content
1	Akiva et al. (2017)	Empirical article	Learning pathways, learning across settings	Secondary education	Out of school, community	Pathways across a community
2	Akkerman and Bakker (2019)	Empirical article	Boundary crossing, learning across contexts	Secondary education, higher education	Multiple contexts	Interest development
3	Alenius (2016)	Empirical article	Learning trajectories	Non-specific/non-applicable	Associations, informal groups, transnational networks	Informal learning processes of migrants
4	Arts and Bronkhorst (2019)	Empirical article	Boundary crossing, learning across contexts	Higher professional education	Formal education, work	Boundary-crossing support
5	Bell et al. (2018)	Empirical article	Learning pathways	Preschool	Preschool, art gallery, family, digital environment	Art learning experiences
6	Bender and Peppler (2019)	Empirical article	Connected learning, learning pathways	Career	School, out of school, digital environment, cosplay community, work	Cosplay/connected learning ecology/learning pathways
7	Brasil et al. (2018)	Empirical article	Learning pathways	Career	Formal education, sport participation contexts	Surf coach learning
8	Bronkhorst and Akkerman (2016)	Review article	Boundary crossing, learning across contexts	Non-specific/non-applicable	School, out of school	Boundary crossing/learning across contexts
9	Buchem (2016)	Theoretical book chapter	Learning pathways	Non-specific/non-applicable	Digital environments, school, out of school, work	Digital badges/digital portfolios
10	Cabot (2016)	Empirical article	Learning trajectories, learning lives, learning ecologies	Upper secondary education	School, out of school, digital environment	Personal English learning ecologies
11	Cattaneo et al. (2015)	Empirical article	Mobile learning	Career	School, work, digital environment	Vocational education and training/mobile learning
12	Chung et al. (2019)	Review article	Mobile learning	Non-specific/non-applicable	Independent, formalized, physical, socializing	Mobile learning
13	Dilger et al. (2019)	Theoretical book chapter	Seamless learning	Non-specific/non-applicable	School, out of school, digital environment	Seamless learning
14	Douglas et al. (2018)	Empirical article	Learning pathways, lifelong learning	Career	Formal, non-formal, informal	Paralympic coach learning
15	Ellmer and Rynne (2016)		Non-specific/non-applicable		Non-specific/non-applicable	Sports
16	Engel et al. (2019)	Empirical article	Learning ecology, learning trajectories	Primary education, secondary education	School, family, digital environment	Subjective learning experiences/ICTs
17	Esteban-Guitart et al. (2018)	Theoretical article	Learning across settings	Non-specific/non-applicable	School, out of school, digital environment, peer groups, family neighbourhoods, cities, nationwide infrastructures	Learning across settings
18	Gilje and Groeng (2015)	Empirical article	Learning trajectories	Career	Formal, informal	Filmmaker, learning identity
19	Green and Portelli (2018)	Empirical book chapter	Learning pathways, lifelong learning	Higher education	Informal, non-formal, NGOs, work	Sustainability, lifelong learning
20	Han et al. (2019)	Empirical article	Language learning ecology	Primary education, secondary education, higher education	Formal, non-formal	Second language acquisition
21	Harrison (2018)	Theoretical article	Boundary crossing	Higher education	Different types of school, informal educational settings	Pre-service teacher training
22	Heccht et al. (2019)	Empirical article	Learning ecology, learning pathways	Lifelong	School, out-of-school	Naturalist learning pathways, interest development
23	Hernández-Hernández et al. (2018)	Empirical article	Learning trajectories	Career	School, out-of-school	Secondary school teacher, cartographies
24	Holden (2016)	Empirical article	Mobile learning	Higher education	School, out of school, digital environment	

Table 1 (*continued*)

N	Author	Type of document	Concept(s)	Educational stages	Learning contexts	Main topic(s) and learning content
						Pre-service teacher training, mobile learning activity
25	Kali et al. (2015)	Empirical article	Mobile learning	Higher education	Class, museum, home, digital environment	Art students, innovative use of technology
26	Kangas and Ukkonen-Mikkola (2019)	Empirical article	Learning pathways	Higher education		Early childhood education practices, multi-voiced communities
27	Kobayashi (2016)	Empirical article	Learning trajectories	Higher education	Academic contexts	L2 academic discourse socialization
28	Kumpulainen (2016)	Empirical article	Learning across contexts	Primary education	School, out of school	Learning across contexts
29	Leander and Hollett (2017)	Empirical article	Learning across settings	Non-specific/non-applicable	Home, school, digital and physical spaces	Embodied rhythms of learning
30	Lockley et al. (2016)	Theoretical book chapter	Learning pathways	Lifelong learning	Formal and informal	Digital badges
31	Louw et al. (2017)	Empirical book chapter	Learning pathways, learning ecologies	Non-specific/non-applicable	Out-of-school, informal learning activities, family	Parent brokering, learning pathways
32	Maul et al. (2016)	Empirical article	Connected learning	Secondary education	School, home, community, peers, digital environment	Connected learning, instrument design
33	Mehmeti and Zittoun (2019)	Empirical book chapter	School trajectories	Life course	School, out-of-school, home	Migrant children, sociocultural dynamics
34	Miño-Puigcercos (2018)	Empirical article	Learning trajectories	Secondary education	School, out-of-school, home, spare time, extracurricular activities, trips and virtual environments	Learning trajectory across contexts in the digital age
35	Pattanayak and Peri (2018)	Empirical book chapter	Learning trajectories/pathways	Career, life course	Non-formal, informal, peer group, formal	Livelihood trajectories of Indian women
36	Peppler and Keune (2019)	Empirical article	Learning across settings	Primary and secondary education	School, out-of-school, makerspaces, digital environment	Portfolios, interest-driven learning
37	Pimmer (2016)	Theoretical article	Mobile learning, boundary crossing	Non-specific/non-applicable	Formal, informal, digital, physical and social	Mobile learning, boundary crossing
38	Pitt et al. (2018)	Empirical article	Learning pathways, learning ecology	Higher education, career	Formal, informal	Digital badges, STEM
39	Rappa and Tang (2017)	Empirical article	Learning across contexts	Secondary education	School, out-of-school, formal, informal	Agency, science literacy
40	Rintala and Nokelainen (2020)	Empirical article	Learning pathways	Upper secondary education	School-based workplace	Vocational education and training (VET)
41	Sefton-Green (2017)	Theoretical article	Learning lives	Non-specific/non-applicable	Social contexts	Learning lives, map learning journeys
42	Sharples et al. (2015)	Theoretical book chapter	Seamless learning	Non-specific/non-applicable	Physical and social context, classroom, out-of-class, digital	Seamless learning
43	Silseth and Erstad (2018)	Empirical article	Learning trajectories	Secondary education	School, out-of-school	Contextualizing instruction, everyday experiences
44	So et al. (2015)	Empirical book chapter	Seamless learning, mobile learning	Secondary education	School, out-of-school, digital	Mobile learning
45	Stromholt & Bell et al. (2018)	Empirical article	Learning across settings	Primary education	School, non-school	Science learning
46	Tasker (2017)	Empirical article	Learning trajectories	Adult learning	Social contexts	Language-learning
47	Toh et al. (2017)	Empirical article	Seamless learning, mobile learning	Primary education	Formal, informal, school, out-of-school, digital	Science learning, mobile technology
48	Tsatsaroni and Sarakinioti (2018)	Empirical article	Lifelong learning	Post-secondary, non-tertiary education, training institutions	Education, life and work	IVETs
49	Van den Beemt and Diepstraten (2018)	Empirical article	Learning ecology	Primary education, career	Formal, informal, school, home, workplace, peer, digital	ICT, teacher professional development
50	van der Rijst et al. (2019)	Empirical article	Learning trajectories, learning path	Higher education, career	University, digital, workplace, formal, informal	University teachers' learning, educational technology
51	Veillard (2015)	Empirical book chapter	Learning pathways	Tertiary education, training institutions	Formal, workplace	Tertiary education, training institutions
52	Veliz and Véliz-Campos (2019)	Empirical article	Learning trajectories	Life course	Geographical, cultural, linguistic, different learning contexts	Language learning, migrants, identity
53	Virkus (2019)	Empirical article	Learning pathways	Higher education	Formal, informal, digital, university, outside formal	Open badges

Table 1 (*continued*)

N	Author	Type of document	Concept(s)	Educational stages	Learning contexts	Main topic(s) and learning content
54	Voon et al. (2019)	Empirical article	Learning trajectories, seamless learning	Career, primary education	Formal, informal, classroom, cyberspace, common daily life, learner community, individual, social, physical, digital	Teacher professional development
55	Wang (2020)	Empirical article	Learning trajectories	Higher education	University, school, friends, family, local communities	Immigrant's identities, language learning
56	Wernholm and Reneland-Forsman (2019)	Empirical article	Learning trajectories	Primary education	Out-of-school, digital, school, informal	Learning identities
57	Wiig et al. (2017)	Empirical article	Learning trajectories	Secondary education	School, out-of-school, learning contexts	Intercontextuality
58	Wong and Looi (2018)	Empirical book chapter	Seamless learning, mobile learning	Primary education	Formal, informal, digital	Seamless learning, science learning

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