16

HYBRIDISING IN AND OUT-OF-SCHOOL LEARNING

Larike H. Bronkhorst and Sanne F. Akkerman

Introduction

There is wide recognition that the once dominant position of formal educational institutions as context for (studying) learning is no longer tenable. The field of education and learning research is in the process of discovering what this means for how we understand and study education and learning. In this process, it is imperative to consider three simultaneous developments notable in societies[1] relating respectively to the dynamics of *who* is learning, *where* learning takes place, and *what* is to be learned (Bronkhorst and Akkerman, 2016). These three developments challenge educational researchers to develop broader, multicontextual, and multidirectional conceptualisations of learning and relational research designs that are responsive to all hybridisations of learning.

Coinciding societal developments

The first development concerns who is learning. For several decades now, societies are becoming increasingly diverse, owing to permanent migration and more temporary worldwide mobility, both physically – although temporarily interrupted by the pandemic – and digitally (Lankshear, 2003 and Ito et al., 2018). As a result, learners across levels, domains, and types of education have become more distinctive in terms of their specific academic, social, and cultural backgrounds. At the same time, widespread societal movements advocating for emancipation of marginalised groups have raised awareness of how the dominant societal labelling systematically dismisses certain discourses and identities (Philip and Sengupta, 2021), for example, when gender

DOI: 10.4324/9781003205838-17

categories are dichotomous and/or ethnicity is singular (see Azevedo and Mann, 2021). In line with this development, we see how educational practices are searching for appropriate ways to differentiate between and be adaptive to individual learners (e.g., Arts and Bronkhorst, 2020 and van Rijswijk et al., 2018).

Consequently, "background" categories to describe and distinguish the individuals *who* are learning are problematic to maintain, and the unicity (or idiosyncrasy, Akkerman and Bakker, 2019) of the individual learner appears widely recognised (Akkerman and van Eijck, 2013). When translated to research, this requires, for instance, research designs with hybrid and dynamic self-identifications (e.g., Akkerman and Meijer, 2011 and Azevedo and Mann, 2021). In parallel, various person-oriented and person-centred approaches are emerging, that move beyond studying differences between groups of categorised individuals (e.g., "minorities" and "STEM-interested students") towards studying individual learners' experiencing, engaging, and gradually defining and developing themselves from the learners' own perspective (Akkerman and Bakker, 2019 and Vermond et al., 2022).

A second development concerns *where* learning materialises. While learning in everyday life has always occurred, possibilities of nonformal and informal learning are currently more widespread, and digitally accessible (Akkerman and Bakker, 2011; Barron, 2006; Erstad and Sefton-Green, 2013; and Ito et al., 2018). As such, individual learners are not just unique in terms of who they are (becoming), but also embody their own specific contexts of participation and learning in and outside of school. Where learning takes shape is increasingly personal, depending, among others, on learners' interests and their opportunity structures for learning, including local and global (digital) networks (Ito et al., 2018).

Schools are showing increased awareness and appreciation of the learning taking place "outside" of their institutions (Bronkhorst and Akkerman, 2016 and Endedijk and Bronkhorst, 2014). At the same time, as reviewed elsewhere in relation to the notion of boundary crossing (Akkerman and Bakker, 2011), different perspectives on learning have emerged to examine connections between participation and learning processes across contexts, often drawing on dialogical and sociocultural theories (Wertsch, 1991), cultural historical activity theory (Engeström and Sannino, 2021), and ecological theories (Barron, 2006 and Markauskaite and Damsa, 2023). Multicontextual perspectives and studies principally take learning to be a process that can extend fixed time frames and places, though at the same time acknowledging the contextuality of the actions and engagements of people. Consequently, different bodies of research have illustrated how learning can be sparked and simultaneously supported by distinctive contexts of participation in and outside of education (Akkerman and Bakker, 2011; Ludvigsen et al., 2010 and

Tuomi-Gröhn and Engeström, 2003). The increase in the use of concepts as life-wide learning, learning lives (Erstad and Sefton-Green, 2013), and funds of knowledge (Hogg, 2011; Moll et al., 1992) indicates that thinking in and across multiple contexts is becoming increasingly common.

Notably, existing research has been informative in illustrating how, despite contexts of participation differing in purpose, meaning, and form (Akkerman and Bakker, 2011), learning may take place across contexts (e.g., Barron, 2006 and Endedijk and Bronkhorst, 2014). Such learning *across* contexts can be seen as a "horizontal" (learning) process[2] (Tuomi-Gröhn and Engeström, 2003) of prolonged engagement with a particular content or activity (i.e., *continuity* in learning, Akkerman and Bakker, 2011). Existing research, however, also reports many situations wherein differences between contexts impede and limit ongoing (inter) actions (i.e., *discontinuity* in learning across contexts) – and we are only beginning to understand the nuances of why and when this is the case.

A third relevant societal development relates to *what* is or ought to be learned, and according to whom. What must be learned could previously be drawn from relatively stable and institutionalised bodies of expertise, reified in textbooks related to well-defined disciplines and specific vocations (Akkerman and Bakker, 2011). The advent of internet enabled wider sharing of knowledge (e.g., via Wikipedia, YouTube, and ResearchGate), including previously unrepresented perspectives (Lankshear, 2003). Moreover, with work and society becoming more dynamic and less predictable (the pandemic being a prime example), interorganisational, intercultural, and interdisciplinary efforts are increasingly considered necessary to address the bigger issues (e.g., related to economy, climate, healthcare, and racism) that are at stake (Akkerman and Bakker, 2011 and Vermond et al., 2022). According to both politicians and scholars, this entails that aside from basic and job-specific skills, additional skills, referred to as transferrable skills, lifelong learning competences and, increasingly, as 21st century skills, should become part of educational curricula. Besides being considered necessary for employability, such skills are arguably essential for active and critical citizenship and for learners to find their way in increasingly open and uncertain societies. Actors in the educational field recognise changing understandings of knowledge and face the challenge of needing to prepare learners both for current and future societies (Kereluik et al., 2013).

At the same time, learners themselves are currently becoming increasingly vocal about what they want or need to learn and what they experience is lacking in their (formal) education (e.g., Bronkhorst et al., 2014). There is increasing scholarly and societal attention for activities (Gutiérrez et al., 2019) and large-scale movements (Boyer and Roth, 2006), wherein learners author the objects of learning and education, ultimately transforming society. As such, with future aspirations becoming less predictable, learning

pathways take different directions (i.e., are essentially multidirectional) and are increasingly difficult to map upfront, challenging research designs that predefine the what (i.e., the object) of learning.

Despite being of a different nature, the three societal developments implicate that a comprehensive understanding of learning in contemporary societies entails researching individuals, who are socially, culturally, and academically unique, participate in their own set of practices both in and outside of education, and face and shape undecided futures (Bronkhorst and Akkerman, 2016).

Consequential research designs

Acknowledging diversity and dynamics in where learning takes place, who is learning, and what is to be learned can have far-reaching consequences for education and learning research. It immediately becomes clear how measurements using predefined learner background categories (e.g., gender as dichotomous, ethnicity as singular; see Azevedo and Mann, 2021), predefined objects of learning (e.g., school subjects; see Slot et al., 2020), predefined contexts of learning (e.g., classrooms; see Bronkhorst and Akkerman, 2016), and single measurement moments (Akkerman and Bakker, 2019) will only reveal a partial understanding of learning (for an extended argument, see Akkerman, Bakker, and Penuel, 2021). Tracing individual learners' lives and contextualising learning whenever and wherever it takes shape is necessary moving forward (Bronkhorst and Akkerman, 2016 and Sefton-Green and Erstad, 2017).

This in turn necessitates responsive methodological designs suitable for capturing dynamic, open-ended learning within and across different contexts, which can be at odds with research practices – particularly funding – that require upfront delineations of the who, what, and where of learning. Taking on this challenge, Akkerman and Bakker (2019) advanced a person-centred perspective and developed a corresponding personalised smartphone application *inTin* to trace individual's self-defined interest engagements across time and space. Using this instrument, Slot et al. (2019) revealed how many engagements (e.g., reading, hockey, playing the piano) are indeed not limited to single contexts, but instead show continuity across contexts, including school. In another study, Slot et al. (2020) documented the idiosyncratic ways in which adolescents experience interest in and across all contexts of participation in their daily lives. When self-defining what captures their interest, most adolescents reported interest in and learning at school, but in widely different ways, ranging from a general preference to engage with school itself, via school breaks, to specifying electron as the object of interest. This apparent interest in school is in stark contrast with findings relying predefined objects (the what) and contexts (the where) of interest and learning – generally

geared towards school (subjects) – reflecting the importance of relational responsive research designs.

In the ERC funded project *Lost in Transition? Multiple Interests in Contexts of Education, Leisure and Work*[3] over 400 learners use inTin and other open-ended instruments to report on their self-defined interest engagements and future aspirations over a period of three years. This period intentionally included learners' expected transition to tertiary education or work (or other self-defined futures) – as transition periods typically bring along new dynamics – and unintentionally included a pandemic with its own dynamics that we are only beginning to understand.

Considering arguments that "faithfully describing movements across timescales and social places is complex, expensive and takes time" (Sefton-Green and Erstad, 2017, p. 249) and therefore not necessarily appealing, we would like to stress and hereafter illustrate that increased recognition for learners' unicity, multicontextual and multidirectional learning can be incorporated in other research designs (c.f. Akkerman, Bakker, and Penuel, 2021). Crucial herein is adapting research designs, by limiting a-priori categorisations of the who, where, and what of learning, but instead deliberately exploring multiplicity in positionings, contexts, and objects of learning.

Empirical illustration: Dis/continuities in a summer science school

Here we draw on data collected by Klaver (2017) in collaboration with the University Science Hub (in Dutch: *Wetenschapsknooppunt*; a school–university network connecting university, schools and teacher education programs) for her master thesis supervised by the authors. The Science Hub organises a yearly Science Summer School (3S): a four-day program during the summer holidays wherein children (aged 8–12, the summer school typifies itself as "junior") engage in seven different science related topics. The goal of 3S is to stimulate pupils' so-called science wit (in Dutch: *Wetenschapswijsheid*). Science (in Dutch "*Wetenschap*") here explicitly refers to all the disciplines (including the humanities) the university offers, with educational activities focusing on, among others, DNA, water cleaning, skeletons, Asia, historical sources, and botany.

The activities to engage with the different scientific disciplines are designed by university teachers – with the intent of being inquiry-based, collaborative, and contextualised. During the week, participating children are supervised by university students who either have a pedagogical background or pursue teaching certification. Although 3S is organised during summer holidays and does include playful activities (see Figures 16.1 and 16.2) it can be seen as a formal educational context to some extent (Bronkhorst and Akkerman, 2016), reflected in the expert-novice relations between individuals in the

FIGURE 16.1 Recreating hair colour DNA with candy.

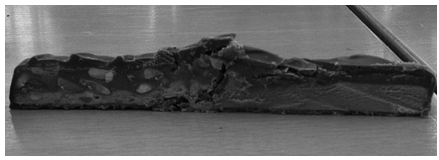

FIGURE 16.2 Simulating tectonic plate movement and mountain development with chocolate bars.

teacher role and the participating children and the pre-designed program using assignments taking place at the university context.

3S acknowledges that while science is highly valued in western societies, access to science (education) is unequal. Hence, 3S is open to children of all academic achievement levels and has created an outreach program which actively recruits children for tuition free participation. Concretely, upon request by 3S, teachers and/or school leaders of 15 selected primary schools in the vicinity alerted their pupils to this outreach program, when teachers judged that these children had interest in and/or aptitude for, but limited access to science (for a variety of reasons, including monetary).

The setup of 3S afforded an exploration of hybrid(ised), multicontextual, and multidirectional learning, specifically focusing on learners' continuity and discontinuity in engaging with, learning about, and positioning towards science. The organisation behind 3S was particularly curious about possible differences owing to children's different backgrounds: those who are enrolled by their parents, whose background is typically "familiar" (e.g., highly educated parents, themselves often working at university) and children who are purposefully invited to take part as part of the outreach program. For the latter students, based on literature (reviewed in Bronkhorst and Akkerman, 2016), one might expect discontinuity: children reporting a lack of connection with science and 3S more generally, as the (science summer) school context is structurally and/or culturally not attuned to their other diverse and primary contexts of participation. For students with a background similar to 3S, based on the literature one might expect continuity: children reporting a connection in terms of engaging in similar activities across

various contexts and/or drawing on resources and experiences in various contexts. Yet, reviewing the literature on continuity and discontinuity in learning across in and out-of-school contexts, we also came across cases that challenged these assumptions, for instance, when continuity did not require (visible) effort, even for students who are singled out as marginal (Bronkhorst and Akkerman, 2016). Considering both the system level (e.g., similarity between 3S and home culture, language, and purposes) as well as at the individual level (e.g., students' interests and self-identification), we set out to study: *What are (differences in) children's understanding of and positioning towards science in relation to continuities and discontinuities in engagement with science across contexts?*

Data collection

The data collection was designed as a concurrent mixed-method design. After securing active parental consent, 403 children (in grade 3–6 in regular education, with a mean age of 10 years and two months) and their parents participated in the research, of which 34 participated via the outreach program. Before the start of the program, the children and their parents completed (partially open-ended) questionnaires about their experience with and attitudes towards science. All children also made mind maps before and after participating in the 3S program. Last, supervisors made structured observations about children's understanding of science and engagement with science during the program. Additional data was collected for a subsample of eight children purposefully matched pairwise on gender, age, and school denomination, while differing in funding of their 3S participation (i.e., outreach or regular). These children's understanding of, positioning towards, and dis/continuity in engagement with science was documented in more detail with participant observations by two trained researchers and daily interviews with the children.

All instruments are geared to uncover the children's self-defined, hybridised understandings of and positioning towards science and if and how engaging with science is part of their wider lives. Hence, in all instruments children are asked to openly describe what science means to them and probed for possible life-wide dis/continuity. In the interviews, children were encouraged to discuss what interests them – also if not part of the intended educational program.

For the current purposes, we analysed the data of two 11-year-old boys, Eitan and Nick (pseudonyms), who were a matched pair in the selected subsample. Eitan and Nick attended different public elementary schools, but participated in 3S during the same week and, after discovering their shared interest in soccer and gaming, became friends. In the following, all quotes refer to interviews with the students, unless otherwise specified.

Findings

Eitan indicated that he wanted to join 3S "because it seemed fun, to get to know new friends". His teacher had suggested it, which both he and his parents mention as reason for his participation ("because school said so", parental questionnaire). Eitan first mentioned that his parents are not involved in science in any way – being unemployed and employed as cleaner due to a disability – but that they are excited about him learning about science. Both parents are born in Turkey, and the family speaks Turkish at home.

Eitan reported soccer, gaming, fixing electronics and, upon probing for school-related engagements, topography and math to be his interests, as well as "things you need to research". He reported wanting to become a soccer player and completely disagreed with the statement "I want to become a researcher" before participating in 3S. The questionnaire and mind map created on the first day as well as his answers during the first interview indicated that he defines research "seeing if and how something works" and searching for answers:

BOX 16.1 EXCERPT 1

I: What comes to mind [when you think of doing research]?
Well, electronics and such, I like that. I want to put things together. How a screen works and why. And how a mouse responds to a computer. Why a mouse starts moving and such. I want to know all that.

I: And what do you know about researching?
That each time you think you can't make it, you don't. But if you think you can, then you can make it. If you research something, but you don't find anything, then you need to go deeper to find out more.

I: Okay. How do you know this?
Because I do quite some research. [..]

I: With whom do you do that?
Well, if something is broken, like I just mentioned, then mostly with my dad. Then we just explore if we can fix it [....].

I: And a question I have here, in your spare time, do you do sometimes do something related to research?
Yes, but not that often. When something comes up, but that's not often. That's why.

I: And do you do research in other cases than when something is broken?
Yes, well just when I don't get a word, I set out to explore what it means and how you pronounce it. [..]

I: How do you do that, that research?

> *I try a dictionary or such, or I try to imagine it. Make chunks, [figuring out] what does this mean, and what does that.*
>
> *I:* Okay. Do you do that often?
>
> *Pff, well I couldn't say really often, but yes. Sometimes, but not always.*

Despite it being his first time at university, Eitan reports continuity in engaging with research ("I do quite some research"), with his description of trying to fix electronics with his dad echoing an approach that can be associated with engineering. Eitan also understands searching for precise meanings of words to reflect his science engagement in his spare time. His "If you research something, but you don't find anything, then you need to go deeper to find out more" also reflects an inquisitive attitude that he relates to science.

Throughout the week, Eitan reports the science activities to be "very new" for him in the interviews, indicating discontinuity, while at the same time reporting continuity, for instance referring to videos he has watched on Turkish networks (e.g., pertaining to effects of oil), outings he has done with his neighbours (e.g., to a milk farm), and daily life (e.g., his father's care for 30 "or so" canaries). His answers in the interviews and observations indicate that he is very engaged during the 3S activities (i.e., raising his hand, encouraging other children to participate), often reporting wanting to know more about topics and considering using research to do so. Observations indicate Eitan sometimes appears to struggle with Dutch language pertaining to the science activities. Early in the week, Eitan became friends with Nick and two of Nick's classmates. They spend most of their breaks playing soccer or fooling around, with observers noting how their supposed difference in background (Eitan being taking part in 3S as part of the outreach program) is in no way reflected in their interactions.

At the end of the week, Eitan's questionnaire, mind map, and interview no longer refer to research as fixing things, but to "finding out how it is". He particularly referred to an attitude of "persevering" in finding things out (and "trying everything" in doing so) and of wanting to share the knowledge gained with others ("Then I can tell how it [DNA] looks like. I would like that"). His parents were very excited about 3S and hope Eitan and his brother can join again next summer. Eitan himself again reported not wanting to become a researcher.

Nick indicated how his mother suggested him to join 3S, and he initially thought "the experiments and the university museum" would be nice. His parents indicated that they thought 3S "would be nice" for Nick, but also mentioned to first having verified with Nick if that was indeed the case. Nick wanted to join but only with a friend, which his mother subsequently

organised. Nick's father is Japanese and "does something with computers" and his mother is Dutch and studies refugees. At home, both Dutch and Japanese are spoken.

In the interview and questionnaire, Nick mentioned enjoying soccer, gaming, drawing, playing guitar, and hanging out with friends, and after probing about school, preferring physical education and "spectrum box" (what he describes as: being assigned a topic to explore and subsequently present). He reported not knowing what he would like to become and responded neutral to the statement about wanting to become a researcher. He defined research as "finding something out" and listed various topics in his mind map about science, including "police", referring to their use of fingerprints to find suspects, and "bacteria", referring to their role in developing medicines. The interview further explored his understanding of science:

BOX 16.2 EXCERPT 2

I: What do you already know about science? [...]
Well, about researching ah, my mom often tells me stuff about that she is going to ask all kind of people questions, just like you are doing now.

I: Oh really?
Yeah, and then she does all sorts of things with the answers and then she will write something about it. I think.

I: So, you know what you've learned from your mom, about interviewing, asking questions.
Yes

I: What else do you know about science, or about research?
Not that much actually.

I: No?
No.

I: Something from school or from reading?
Well, that it usually starts with what, why and how questions. Or something.

I: Okay.
Eh and that er [silence]. Yes.

I: Yes?
Yes.

I: Okay. And in your free time, do you sometimes do something related to research?
Well, I don't know why exactly, but I got such a science box with which you can study fingerprints.

I: [...] Who gave it to you, that Science box?
I think grandma. Yes.
I: Did you ask for it?
Yes, I did ask, because I had seen a commercial and it seemed really fun.

Nick also reported continuity in engaging with science. He recognised the interview setup he was partaking in as similar to what his mother does professionally ("just like you are doing now") and was gifted a science box to study fingerprints by his grandmother, after he had requested it. Note that despite this apparent continuity in engagement with science, he qualified his knowledge of science as "not that much".

Throughout the week, Nick consistently reported being interested in and wanting to know more about the various topics he objectifies in the interviews as having caught his interest (e.g., ground drilling, parasites, and land maps). He was particularly excited about visiting the lab to do experiments as "he had never been there before". He frequently referred to having talked, read, and experimented about topics that have come up during the 3S activities (i.e., continuity) with his grandparents, who care for him on Tuesday and Thursday afternoons. But at the same time, not all of 3S reflected a continuation of his wider life. He particularly stressed when he knew little about certain topics (e.g., parasites, DNA). Observations indicated that Nick did not ask a lot of questions in front of the whole group and is frequently considered "off task", except for small group work, when he was reported to be engaged in working with his friends.

At the end of the week, Nick's questionnaire responses and mind map were strikingly similar to those at the beginning of the week, mainly indicating a topical understanding of science and a neutral stance towards becoming a researcher. The only notable difference was that Nick's mind map now also includes activities ("learning" and "finding things out"), next to topics of research. At the end of the week, when asked if there is something that the interviewer should know for her own research, Nick responded with a smile: "No, I think you have made milked it completely".

Discussion

In this chapter, we drew attention to widespread hybridisations and dynamics in who is learning (the subject), where learning materialises (the contexts),

and what is to be learned (the objects). These three societal developments invite us to reconsider our practices of studying learning relying on predefined subjects, objects, and/or contexts. A scholarly focus on more dynamic and open-ended learning processes becomes especially relevant (Akkerman, Bakker, and Penuel, 2021) in the context of more pertinent societal challenges related to increasing mobility, accelerating technological developments, urbanisation, increasing stress on well-being, and climate issues (Rajala, Jornet, and Accioly, 2023). These societal challenges make it harder than ever to foresee the future and challenge every individual to reconsider how to care for self and world in new relational ways. This challenge surpasses single sites, institutions, and defined periods and outcomes for learning, and accordingly asks from us as educational scholars to expand our scope.

Our empirical example exploring dis/continuity in understanding of, positioning towards, and engagement with science was intended to illustrate that first steps in doing justice to these societal developments can entail adapting what can be considered a "traditional" mixed-method design. Particularly, in the data collection, adaptations for relational responsive research involve continuous facilitation of and attention for multiplicity in personal understandings of the object(s) of learning and purposeful explorations of possible life-wide (dis)continuity in engaging with these objects. Concretely, this entails having individuals self-define the object and the context(s) of their learning, and themselves in relation to these objects and contexts. Although our reporting here mainly reflects interview and observation data, our analysis also considered the concept maps of science children created that are arguably more feasible to analyse in large-scale studies. In terms of data-analysis, a person-centred perspective or looking "from within" invites us to make sense of learning from an individual's own unique perspective. Concretely, this involves within and across case analyses, comparing patterns instead of variables across cases (e.g., Ayres, Kavanaugh, and Knafl, 2003). Research design and researchers in turn also need to echo relationality and responsivity, in other words being of and in the world and staying attuned with what matters (i.e., synchronicity, Akkerman, Bakker, and Penuel, 2021), cognizant of their own biases and limitations and open to learning themselves (Bronkhorst et al., 2013).

Such adaptations are undoubtedly challenging and time-consuming, but inevitable to reveal a more comprehensible understanding of learning – as our empirical example indicated. First, our analysis illustrated the limitations of upfront categorisation of who is learning. Instead, it showed how Eitan and Nick are boys of similar age and have similar interests in soccer, gaming, and goofing around. They both speak another language at home and both of their parents are excited about them participating in SSJ, without Eitan and Nick themselves actively considering a future for themselves as researchers. It can be questioned if these similarities[4] would have come to the fore,

if the program's categorisations (i.e., "outreach", and "regular" by default) would have been adopted – if only for conveniency – as is routinely done in education and learning research (Akkerman, Bakker, and Penuel, 2021).

Second, our analysis drew attention to hybridisations in what is being learned. While Eitan and Nick could thus be considered similar in some respects, differences between their learning in the same program should not be overlooked. First, their understanding of and interest in science differs substantially, especially at the start of 3S, with Eitan's understanding of science reflecting an attitude and Nick's understanding being topical. When using a predefined definition of science, these differences could have gone unnoticed, while they are consequential for future learning (e.g., Barron, 2006 and Ufer, Rach, and Kosiol, 2017), and/or could easily have resulted in but one of these understandings (and with that only one of these children) being recognised as developing "science wit".

Third, our findings echo how dynamics in where learning takes place matter. Nick's multicontextual opportunity structure for science appears notably richer, with his mother being a researcher, his grandparents providing (materials for) experiments, and his elementary school using inquiry activities. In comparison, Eitan's opportunities to engage with science in other contexts seem less structural: only when something is broken or when an opportunity for an outing presents itself. While these differences are important to consider and where possible equalise (e.g., DiGiacomo, Van Horne, Van Steenis, and Penuel, 2018), we should at the same time remain attentive that such observable differences do not uniformly translate into experiencing dis/continuities (see also Bronkhorst et al., 2013) and learning. Particularly noteworthy in this respect is the amount of continuity Eitan reports with science as offered in S3 and the various instances wherein Nick does not report S3 to be a part of an ongoing learning process, illustrating the importance of understanding learning and learners "from within".

We end by acknowledging that in order to do research, not everything can remain hybrid and open-ended (Akkerman and Niessen, 2011). For instance, in the empirical illustration, we limited the object to science in a broad sense, whereas both children also expressed avid interest in and across-context engagement with soccer. An analysis of soccer would likely have revealed different object-specific dynamics of learning, plausibly revealing even more continuity across contexts, with soccer resources being widely available in Dutch society, and Eitan envisioning soccer to be prominent in his (professional) future. Hence, we advocate to carefully consider how even arguably sensible (upfront) limits to the who, where, and what of learning in research designs reveal contextualised understandings of learning, for which we as researchers should be accountable.

Acknowledgements

The illustrative examples were meticulously documented by Lida Klaver for her master thesis.

Notes

1 The three developments are drawn from available studies of education mainly in the context of so-called WEIRD societies, that is, societies with Western, Educated, Industrial, Rich, and Democratic populations. This implies that our claims might be biased and do not necessarily translate globally.
2 Compared to a vertical (learning) learning as progressive participation and/or knowledge accumulation within a bounded domain or system.
3 Akkerman, S.F. (2017–2023). Lost in Transition? Multiple Interests in Contexts of Education, Leisure and Work. ERC Starting Grant.
4 Parental SES being the notable exception, reflected here in differing opportunities structures for engaging with science, discussed subsequently.

References

Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of educational research*, *81*(2), 132–169.

Akkerman, S. F., & Bakker, A. (2019). Persons pursuing multiple objects of interest in multiple contexts. *European Journal of Psychology of Education*, *34*(1), 1–24.

Akkerman, S. F., Bakker, A., & Penuel, W. R. (2021). Relevance of educational research: An ontological conceptualization. *Educational Researcher*, *50*(6), 416–424.

Akkerman, S. F., & Meijer, P. C. (2011). A dialogical approach to conceptualizing teacher identity. *Teaching and teacher education*, *27*(2), 308–319.

Akkerman, S., & Niessen, T. (2011). Dialogical theories at the boundary. *Dialogicality in Focus: Challenges to Theory, Method and Application*. New York: Nova Science, 61, 72.

Akkerman, S. F., & Van Eijck, M. (2013). Re-theorising the student dialogically across and between boundaries of multiple communities. *British Educational Research Journal*, *39*(1), 60–72.

Arts, M., & Bronkhorst, L. H. (2020). Boundary crossing support in part-time higher professional education programs. *Vocations and Learning*, *13*(2), 215–243.

Ayres, L., Kavanaugh, K., & Knafl, K. A. (2003). Within-case and across-case approaches to qualitative data analysis. *Qualitative health research*, *13*(6), 871–883.

Azevedo, F. S., & Mann, M. J. (2021). An Investigation of Students' Identity Work and Science Learning at the Classroom Margins. *Cognition and Instruction*, 1–27.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human development*, *49*(4), 193–224.

Boyer, L., & Roth, W. M. (2006). Learning and teaching as emergent features of informal settings: An ethnographic study in an environmental action group. *Science Education*, *90*(6), 1028–1049.

Bronkhorst, L. H., & Akkerman, S. F. (2016). At the boundary of school: Continuity and discontinuity in learning across contexts. *Educational Research Review*, *19*, 18–35.

Bronkhorst, L. H., Koster, B., Meijer, P. C., Woldman, N., & Vermunt, J. D. (2014). Exploring student teachers' resistance to teacher education pedagogies. *Teaching and Teacher Education*, *40*, 73–82.

Bronkhorst, L. H., van Rijswijk, M. M., Meijer, P. C., Koster, B., & Vermunt, J. D. (2013). University teachers' collateral transitions: continuity and discontinuity between research and teaching. *Infancía y Aprendizaje*, *36*(3), 293–308.

DiGiacomo, D. K., Van Horne, K., Van Steenis, E., & Penuel, W. R. (2018). The material and social constitution of interest. *Learning, Culture and Social Interaction*, *19*, 51–60.

Endedijk, M. D., & Bronkhorst, L. H. (2014). Students' learning activities within and between the contexts of education and work. *Vocations and learning*, *7*(3), 289–311.

Engeström, Y., & Sannino, A. (2021). From mediated actions to heterogenous coalitions: four generations of activity-theoretical studies of work and learning. *Mind, Culture, and Activity*, *28*(1), 4–23.

Erstad, O., & Sefton-Green, J. (Eds.) (2013). *Identity, community, and learning lives in the digital age*. Cambridge University Press.

Gutiérrez, K. D., Becker, B. L., Espinoza, M. L., Cortes, K. L., Cortez, A., Lizárraga, J. R., Rivero, E., Villegas, K., & Yin, P. (2019). Youth as historical actors in the production of possible futures. *Mind, Culture, and Activity*, *26*(4), 291–308

Hogg, L. (2011). Funds of knowledge: An investigation of coherence within the literature. *Teaching and Teacher Education*, *27*(3), 666–677.

Ito, M., Martin, C., Pfister, R. C., Rafalow, M. H., Salen, K., & Wortman, A. (2018). *Affinity online: How connection and shared interest fuel learning* (Vol. 2). NYU Press.

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of digital learning in teacher education*, *29*(4), 127–140.

Klaver, L. (2017). Children's Distance to Science: Science Capital and Attitudes towards Science in the Context of Summerschool Junior. Unpublished master thesis. Utrecht University.

Lankshear, C. (2003). The challenge of digital epistemologies. *Education, Communication & Information*, *3*(2), 167–186.

Ludvigsen, S., Lund, A., & Rasmussen, I. (2010). Introduction: Learning across sites; new tools, infrastructures and practices. In Edwards, A., Ludvigsen, S., Lund, A., Rasmussen, I., & Säljö, R. (Eds.), *Learning across sites: New tools, infrastructures and practices* (pp. 13–26). Routledge.

Markauskaite, Carvalho, & Damsa, C. (2023). Ecological perspectives on learning and methodological implications for research. In Damşa, C.I., Rajala, A., Ritella, G., & Brouwer, J. (Eds.), *Re-theorizing learning and research methods in learning research, New Perspectives on Learning and Instruction*. Routledge.

Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into practice*, *31*(2), 132–141.

Philip, T. M. & Sengupta, P. (2021). Theories of learning as theories of society: A contrapuntal approach to expanding disciplinary authenticity in computing, *Journal of the Learning Sciences*, *30*(2), 330–349. doi:10.1080/10508406.2020.1828089

Rajala, A., Jornet, A., & Accioly, I. (2023). Utopian methodologies to address the social and ecological crises through educational research. In Damşa, C.I., Rajala, A., Ritella, G., & Brouwer, J. (Eds.), *Re-theorizing learning and research methods in learning research, New Perspectives on Learning and Instruction*. Routledge.

Sefton-Green, J., & Erstad, O. (2017). Researching 'learning lives'—A new agenda for learning, media and technology. *Learning, Media and Technology*, *42*(2), 246–250.

Slot, E. M., Akkerman, S. F., & Wubbels, T. (2019). Adolescents' interest experience in daily life in and across family and peer contexts. *European Journal of Psychology of Education*, *34*(1), 25–43. doi:10.1007/s10212-018-0372-2

Slot, E. M., Bronkhorst, L. H., Wubbels, T., & Akkerman, S. F. (2020). The role of school in adolescents' interest in daily life. *International Journal of Educational Research*, *104*, 101643.

Tuomi-Gröhn, T. & Engeström, Y. (2003). *Between school and work: New perspectives on transfer and boundary-crossing*. Pergamon.

Ufer, S., Rach, S., & Kosiol, T. (2017). Interest in mathematics = interest in mathematics? What general measures of interest reflect when the object of interest changes. *ZDM*, *49*(3), 397–409. doi:10.1007/s11858-016-0828-2

Van Rijswijk, M. M., Bronkhorst, L. H., Akkerman, S. F., & van Tartwijk, J. (2018). Changes in sensed dis/continuity in the development of student teachers throughout teacher education. *European Journal of Teacher Education*, *41*(3), 282–300.

Vermond, D., El Habhoubi, S., de Groot, E., Bronkhorst, L., de Wit, N., & Zwart, D. (2022). Dealing with Discontinuity in Cancer Care Trajectories: Patients' Solutions. *The Patient-Patient-Centered Outcomes Research*, *15*, 121–130.

Wertsch, J. V. (1991). A sociocultural approach to socially shared cognition. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 85–100). American Psychological Association.