

# Multiple Legitimate Language Games in Family Serendipitous Science Engagement

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**Abstract:** In this paper, I explore the nature of family-based Serendipitous Science Engagement, analyzing a case of three children and a mother engaging with bugs they discovered in their yard. Employing linguistic ethnography methods, the analysis reveals how the absence of designated goals afforded legitimate multiple "language games", which supported each other. Guided participation entailed authentic sense-making modeling and gradual participation in the sense-making game, without abandoning other games. Theoretical and practical implications are discussed.

**Keywords:** family learning, informal science learning, language game, linguistic ethnography, parent-child interaction, science learning, self ethnography, socio-cultural theory

## Introduction

Learning takes place everywhere: in designed environments such as museums and schools, as well as in unstructured ones such as family meals (Tal & Dierking, 2009). Whereas the vast majority of research on out-of-school learning focuses on designed environments, research on serendipitous, spontaneous undesigned learning is scarce. Few studies have documented serendipitous learning, demonstrating how it may afford deep engagement in exploration (Crowley & Jacobs, 2002), skill improvement (Ochs, et al., 1992), and knowledge co-construction (Goodwin, 2007), resulting in the development of science learning pathways (e.g., Bricker & Bell, 2014). However, these studies did not focus on the unique nature of serendipitous science engagement (SSE), which I define as free-choice engagement in an undesigned environment, i.e., voluntary engagement in an environment that does not entail prior educational scientific goal.

To better support SSE, or at least not interrupt it, we need to understand it better. In this study, I provide an account of family-based SSE, obtained through self-ethnography, and discuss how we might explore and conceptualize it, employing language games and guided participation frameworks.

## Theoretical framework

### Learning as participating

Framed by a socio-cultural perspective, Rogoff and colleagues (1993) suggested viewing learning as a process of "guided participation" in which an experienced member of the community supports novices' learning by bridging between the familiar and the novel, connecting observations, information, behavior, and meanings in a shared endeavor. "Guidance" refers to the "direction offered by cultural and social values, as well as social partners"; "participation" refers to "observation, as well as hands-on involvement in an activity" (Rogoff, 2008, p. 60). Guided participation extends the Vygotskyian notion of *zone of proximal development* by emphasizing tacit knowledge and communication rather than only explicit, didactic, verbal academic instruction; it includes "not only the face-to-face interaction, which has been the subject of much research, but also the side-by-side, joint participation that is frequent in everyday life" (Rogoff, 2008, p. 60).

Guided participation in families (and elsewhere) entails modeling. In modeling, participants observe more experienced members (e.g., parents, siblings, peers) exhibiting a model of "expert performance", which includes internal cognitive processes and tacit knowledge, as well as motivational and emotional processes and behaviors (Schoenfeld, 1985). The situatedness of learning is another important aspect of guided participation (Brown, Collins, & Duguid, 1989), in which people are engaged in an authentic activity facing ill-structured tasks and real-life problems. SSE is inherently situative, as it entails real-life, authentic contexts and unstructured tasks.

In this study, I look into processes of guided participation to explore the nature of SSE. In doing so, I also aim to add to the theory of guided participation in two ways. First, Rogoff et al. (1993) studied child-parent guided participation focusing on shared endeavors or "mutual engagement in the same agenda" (p. 68). They analyzed tasks that entailed a designated set of practices and goals (such as correctly operating novel objects or dressing). However, in everyday situations (and in particular in serendipitous ones), there is not always a designated goal, and therefore the agenda or the relevant practices are not always shared. In this study, then, I ask: what is the nature of guided participation when participants do not share the same agenda and may pursue disparate

goals? Second, Rogoff (1993, 2008) focused on non-academic activities, while I explore how guided participation in informal settings advances children's academic participation (i.e. their scientific practice).

## Language games

Building on and expanding Rogoff's (2008) notion of "purposes involved in shared endeavors" (p. 64), I analyze guided participation through the lens of "language games". "Language games" are frames we ascribe to an activity to make sense of it (Wittgenstein, 1953). Language games are mostly implicit; we are not aware of it and of the "rules of the game" that guide us. Nevertheless, the game defines our goals, roles, legitimate courses of action, symbols' meaning, tools, and expectations (Sfard, 2001). The same situation may constitute several games, negotiated from moment to moment as the interaction unfolds. For example, in the classroom, a teacher may frame an activity as "science learning", while students may frame it as "maintaining social status"; The game "science learning" has the objective of developing understanding and skills, and entails teachers' and students' roles; rules such as "teacher asks, students answer"; scientific terms as symbols, and tools such as textbooks. The "maintaining social status" game may have the objective of appearing "cool"; the roles of the "popular kid" or the "geek"; rules such as "exhibit disinterest"; slang as symbols, and tools such as forbidden Smartphones.

Language games are a fruitful prism for analyzing learning processes. Wertsch (1979) analyzed parents assisting their children in solving a puzzle and argued that a child develops as she comes to share the adult's language game. It was also used to explore classroom interaction and student engagement and sense-making processes (Fleener, Carter, & Reeder, 2004; Sfard, 2001).

## Methods

### Research approach

Studying family-based SSE is inherently challenging: How can a researcher capture serendipitous activity as it unfolds? If s/he cannot anticipate when and where engagement will occur, how can s/he be in the right place at the right time to observe and record it in real time, as it evolves? To confront this challenge, I have conducted a "self-ethnography", documenting SSE in my own family. In self-ethnography "the researcher-author describes a cultural setting to which s/he has a "natural access", is an active participant...The researcher then works and/or lives in the setting and then uses the experiences, knowledge and access to empirical material for research purposes." (Alvesson, 2003, p. 174). Previous studies exemplify the value of self-ethnography by a parent-researcher, affording access to empirical accounts and aspects of the phenomenon (such as continuity) that might not otherwise have been accessible to research, as well as familiarity and pre understanding of the context (Bissex, 1985; Long, 2004; Yoon, 2012). While the challenge of ethnography is usually to "break in" to the lived experiences of others and develop "closeness" to the "native" perspective, the challenge in self-ethnography is to "break out" of the familiar, implicit, and taken for granted. Thus, while in ethnography, the researcher needs to "make the strange familiar", in self-ethnography, s/he needs to make the familiar strange (Alvesson, 2003). To accomplish this, I used linguistic ethnographic methods, which allow the researcher "to get analytic distance on what's close-at-hand" (Rampton, 2007, p. 590).

### Context and data collection

I collected the data during 2012-2013, when my family and I lived in Australia (due to my husband's sabbatical leave), and I homeschooled my sons (aged 8.5 and 11). Instead of attending school, they spent most mornings with me, engaging in planned educational and recreational activities (such as math learning, cooking, visiting museums, and cycling), as well as serendipitous activities (such as the one analyzed here). I collected the data by intensive observations, participant-observations, audio-records, and a journal, all documenting my children's engagement with science content and practice. In total, during that year, I audio-recorded 305 engagement episodes (ranging from 30 seconds to 66 minutes). The episodes spanned a variety of everyday settings, such as family meals, car rides, strolling the streets, camping, browsing the web, cooking, and visiting a skate park. All family members were (and are) aware of the study and repeatedly expressed their consent to participate, i.e., to be recorded, analyzed and reported.

The dual role of a parent-researcher raises methodological challenges, such as: (1) the question of whether my awareness of the research induced the children's engagement and thus eliminated the possibility of serendipity. I argue that by adhering to the definition of SSE and closely examining the data, it is reasonably possible to discern SSE from other episodes, even in self-ethnography; (2) the tradeoff between rich, full documentation and authenticity. I argue that it is often possible to identify in the audio recordings when the children were aware of the recording and "acted out" on its behalf, and to account for such acts in the analysis;

and (3) the specificity of the context. clearly the goal is not to generalize but rather to elucidate what SSE may entail in an “extreme case” such as this (i.e., where parents are both scientifically educated and has plenty of time to spend with their children).

In this paper, I analyze one SSE episodes, which in and of itself constitutes an “extreme case” among the other SSE episodes in the dataset: This was the longest recorded episode (66 min), it met the definition of SSE for all participants, it entailed high level of behavioral, cognitive and emotional engagement in both science content and practice, and overall it was particularly fun and exciting.

## Analysis

Using linguistic ethnography methods, I repeatedly listened to the data, transcribed it in detail, and brainstormed (on my own and with colleagues) about what was happening and what we found interesting (Rampton, 2007). Then, I used micro-analytic methods to analyze the sequential unfolding of the episode, which included proceeding slowly through the text, asking at each line “What is the speaker doing?”; “Why now?”; “How does this turn of talk respond to what preceded it?”; “What else might have been done here but wasn’t?” and so forth. To account for the temporal dimension of learning, I looked at the textual trajectories (Blommaert, 2005) of discourse across the episode, which involved moving backwards and forwards through time, tracking threads of text, ideas, and concepts, how they were used, when, and by whom.

Initial analysis pointed to the prominence of multiple language-games, directing me to focus the subsequent analysis on two research questions: (1) What games do participants “play”? and (2) How do the games evolve? To answer these questions, I re-analyzed the data using the same method as before, with the addition of systematically and iteratively coding each utterance for its corresponding game(s) and how they evolved, searching for emerging patterns. I conducted this analysis myself, then circled around a draft of the analysis and emerging understandings, and had colleagues acting as “critical friends” review it and comment on it.

The original language of the episode was Hebrew, and I have worked from the Hebrew recording and transcript throughout the analysis. In presenting the case and its analysis, I use the third person to refer to myself (calling myself “Dana” or “Mother”) to represent the analytic distance I have developed over the years that have passed since the data was collected and the numerous cycles of its analysis and presentation.

## Data and findings

This SSE episode took place in December 2012. Dana, the mother, was home with her sons, Shahar and Yoav, and with Amit (Shahar's friend). The three children and Dana planned to spend the morning making Pizza. Dana was in the kitchen, while the children hung out in the backyard waiting for her to call them. Suddenly Dana heard them calling. She grabbed the recording device, which was on the table, pressed “Record” and ran outside, finding the children inspecting black and orange insects on a citrus tree, jumping and calling excitedly, “*I’ve never seen this many in my life! ...there’re millions here... Mom, you won’t believe it. There’re millions of ‘em. Here! Here! There! There!*”

For the next 66 minutes, the children were engaged with the insects, with Dana joining them and departing occasionally, leaving the recording device close by. None of them saw those insects before. They observed the insects, collected them into a box, and searched for others in various places in the yard. They discussed topics related to the insects' appearance, behavior, needs, and relations. Dana searched online and found that the insects were Citrus Stink Bugs, which change colors from orange to black as they mature, live on citrus trees, suck their sap, and secrete a repellent substance when distressed. After an hour, the children and Dana turned to the kitchen to make Pizza, as planned, but they continued discussing the experience and the insects.

The analysis revealed that participants were engaged in five prominent language games: Sense-making, treasure hunting, daring, caring and admiring.

### The sense-making game

Playing this game, participants construe the activity as one that is about trying to make sense of the phenomenon. This includes trying to specify the bugs (e.g., “*what is it?*”, line18), raising questions (“*what's the difference between the red ones and the black ones?*”, 47), hypothesizing (“*maybe it's a stage in maturation*”, 192), investigating (“*I want to find out what they are and what's their deal*”, 146), exploring (“*we can really explore them like this*”, 481), observing (“*It's possible to look at them through magnifying glass*”, 151), and more.

### The treasure hunt game

Playing this game, participants construe the activity as one that is about: (1) searching (as in “*it's fun to look for them*”, 718); (2) finding (“*here's another one. Wow!*”, 30); and (3) pointing and sharing (“*look, a caterpillar*”,

24). Participants maintain this game by expanding the “hunt” in 3 different ways: (1) by expanding the game to additional locales, searching for bugs on other trees and in other parts of the yard; (2) by expanding the game to virtual spaces, searching for pictures of the bug online; and (3) by changing the scale of the game through closer observation of the bugs in the box, searching, finding and pointing out finer features. While such expansion may also serve the sense-making game, at moments its purpose is the mere searching and finding (without attempting any “understanding”).

### The daring game

Playing this game, participants construe the activity as one that is about exploring their courage, experiencing the thrill of the extreme, dangerous, and forbidden. Immediately from the beginning and continuing throughout the whole episode, Amit is preoccupied with daring to touch the bugs (e.g., “*I want to take one off [the tree], but I don’t want to touch it*”, 100). He challenges the others to touch it (“*who dares to touch?*”, 102), repeatedly discussing whether they are dangerous (“*it’s probably really dangerous*”, 54) and capable of flying (“*can they fly?*” 15). I relate his repeated reference to flying (15 utterances) to the daring game, as he is “*scared that one will jump on my head or something*” (261) and “*if I touch it, it’ll fly*” (727), and when one indeed flies, he shrieks and yells (and laughs): “*So scary! It flew over me...So crazy...you’d die if it happened to you!*” (1,003-1,008). All three children get very excited when the bugs crawl on each other’s backs. The bugs’ “copulating” behavior repeatedly draws a lot of attention, including the use of foul language (e.g., “*I want them to have sex*”, 588), which I argue is part of the daring game. “Poo” and “Pee” are heard often too, for example regarding how the caterpillar appear (“*It looks like poo*”, 210) or the bugs’ secretions (“*it peed on you*”, 933).

### The caring game

While Yoav and Amit are dominant in the daring game, Shahar appears more engaged in the caring game, construing the activity as one that is about taking care of the bugs. Yoav and Amit also participate in this game, and together they prepare a place for the bugs (bringing a box, filling it up with leaves and fruit, and punching holes in the lid), negotiating the conditions that best suit them (e.g., “*we need them to have, to feel comfortable*”, 512), collecting them (“*I want to bring another one*”, 370), keeping them in the box (“*they escaped*”, 897), and empathizing with them (Yo, *poor guy! It’s tough for him, his antenna’s broken.*”, 610).

### The admiring game

Playing this game, participants construe the activity as one that is about admiring and getting excited and enthusiastic about various objects. It is manifested through expressions of excitement (such as “wow”, “yo” and “cool”), intonation, laughing, and shrieking. It addresses the quantity of bugs (e.g., “*Mom, you won’t believe it. There’re millions of ‘em*”, 4), size (“*it’s so huge!*”, 992), behavior (“*yo, look! It pooped on me*”, 238), cuteness (“*what a sweetheart...what a cutie-pic*”, 488-489), aesthetic (“*they’re insanely beautiful*”, 729), and the activity (“*it’s so fun*”, 653). Participants are not merely responding emotionally but are busy triggering and maintaining the excitement. For example, after about 33 minutes, when the children are sitting observing the bugs in the box, there is silence and the excitement seems to have faded, Yoav tries to re-ignite it, suggesting ways to make the activity fun again: “*Yoooo I have an idea. It’s the most fun with insects. You take all sorts of sticks like this so they walk above and then they like climb upwards*” (662).

## **Modeling and guided participation**

Dana’s modeling is particularly prominent in the sense-making game. When she first sees the insects, she immediately asks, “*What is it?*” (18), modeling interest in classification. She then tentatively suggests a classification: “*looks like a kind of bug*” (20), modeling caution of jumping into conclusions (as she could have said, “it’s a bug” even if she was not certain). The fact that Dana does not know what the insect is, allows her to authentically model this scientific practice. The children ignore Dana’s classification attempt, pointing to the bugs’ “copulating” and trying to draw Dana’s attention to it “*Yo here they’re copulating... Mom, they’re copulating.... Look, they’re copulating*” (21-26). Dana ignores their calls, refusing to play the daring game. Yet, weaving in the hunting game, she addresses Yoav noticing a caterpillar by modeling sense-making behavior, hypothesizing, “*maybe it’s her caterpillar? And they’re hatching here from the caterpillars now?*” (25). However unreasonable Dana’s hypothesis (caterpillars turn into pupae and not immediately into the mature form), raising it constitutes sense-making behavior and an authentic modeling of raising hypothesis.

Dana’s unreasonable hypothesis is challenged by Yoav over an hour later, when they are making Pizza and Yoav is reasoning that it does not make sense that the caterpillar is a phase in the bug’s life cycle: “*cause, mom, we saw a tiny green one... it doesn’t make sense that that size comes out of the caterpillar*” (1080). Dana accepts his argument and changes her mind: “*what you’re saying makes sense. So maybe they don’t have a*

*caterpillar. The caterpillar isn't related*" (1081). This both constitutes another example of the children's delayed uptake, and illustrates how the authenticity of Dana's sense-making allowed the children to move, with time, beyond their initial games into the sense-making game.

When Dana finally addresses "copulating", she weaves it into the sense-making game, asking Yoav to provide evidence that the bugs are indeed copulating: "*how do you know?*" (27). In doing so, she models another type of sense-making behavior, driving Yoav to ground his argument: "*Look, their ass is hooked.*" (28).

A little later, Dana suggests using a magnifying glass and searching online, but the children are engaged in a different game, so she follows her interest herself: she goes to the far end of the yard to look for bugs on other trees. While the children are not joining her, they can hear her talking to herself: "*I want to find out who they are and what's their deal and why they're only on the citrus tree...I'm going to see if they're on other trees as well*" (146, 162), and when she returns, she says: "*it's a citrus tree insect, 'cause on that side [of the yard] there's another citrus tree and it also has [bugs] on it. And only on it. Like, there're none on the other trees*" (171). Here, Dana models: (1) Interest in understanding "*what's their deal*"; (2) collecting evidence – although Dana already noticed that the bugs are only on the citrus tree, she goes to collect more evidence; and (c) induction – Dana verbalizes the logic that guides her conclusion: this is a citrus tree insect because I found another citrus tree, and the insects are on this tree and only this tree. These practices are later echoed in the children's behavior, (e.g., going to the far end of the yard to look for more bugs) and in their language (e.g., using the phrase "I'm interested if/why" the same way as Dana).

Then, Dana brings the laptop and searches online, again modeling the inclination to explore ("*I'm going to bring the computer. I'm dying to see what it is*", 350). When surprisingly quickly, she finds the bugs online, she expresses sincere excitement, transferring the treasure hunt game to the virtual space, repeatedly calling "*here it is! Yoo! I found it! Cool! First hit. Look. It's the first picture that came up, So cool.*" (386). Only then does she switch back to the sense-making game, reading the online information aloud. While the children appear disengaged in the sense-making game, they later use this information to participate therein, for example by planning to track changes in the bugs' color over time (lines 686-690), as well as by predicting, explaining, inferring, arguing, providing evidence, and more.

The examples I presented illustrate how Dana, as the more experienced member, modeled ways of participating in the games, mostly (yet not exclusively) the sense-making game. She modeled sense-making behavior and inclination while the children were still immersed in the treasure hunt, daring, and caring games; she did so by exhibiting intellectual curiosity, wondering and querying, collecting data, hypothesizing and making evidence-based inductions and expressing positive affect toward these processes. In addition, she supported the children's participation in the sense-making game by bridging between it and the other games, as well as by recruiting resources to solve the mystery of the insects, and making these available to the children. Although initially the children did not share the sense-making game with her, gradually they expanded the games they were playing (i.e., their definition of the situation) and their ways of participating therein. In doing so, they did not abandon their initial games (e.g., Amit still reflects on the thrilling experience of the bug flying over him even as they are already making pizza).

## Discussion

The analysis elucidates legitimate multiple games as a prominent feature of this SSE episode. Participants simultaneously played five language games, with no one participant trying to regiment discourse and impose a certain game over others. This was inherently related to the absence of pre-set goals. Thus, the children could engage in the treasure hunt, admiring, caring, and daring games for a relatively long time before they shifted to the sense-making game. On one hand, when time is limited this might be viewed as a constraint. On the other hand, as this case shows, it may afford the weaving of games into the sense-making game, in an enjoyable, autonomous manner: one game supports the other as the children use new knowledge to make sense of their caring and daring games, in ways that might not be possible when only one dominant game is recognized and/or when time is restricted. The latter is often the case in formal learning environments (such as classrooms) as well as non-formal designed environments (such as museums) (Tal & Morag, 2007). Thus, while SSE inherently affords multiple legitimate games, for these to be productive, abundant time is required. In so saying, I do not mean to imply that regimented discourse is not possible in SSE, but rather suggest that one potential unique characteristic of SSE is legitimate multiple language games over relatively long periods of time.

The analysis also suggests that, at times, when children appear to be ignoring the sense-making game, they are actually attentive to it, picking up ideas, which they later use in delayed uptake (Mercer, 2008). Likewise, while the language game perspective has previously been employed primarily to exemplify how students may appear engaged in learning while they are actually playing other games, in this case the children appeared "playing" while they were actually learning. But what do they learn?

The children's participation evolved in a certain direction as the activity unfolded. This development is associated with observing Dana's practice and engaging therein with her, as well as in Dana's bridging between games. The shifts in the children's participation in the games constitute a process of guided participation. Thus, learning in SSE, may be viewed as the evolution of language games, in particular the sense-making game. Such evolution may entail employing additional definitions of the situation (i.e., joining the sense-making game) and/or expanding the ways of participating in familiar games (i.e., participating in the sense-making game in new ways). These may occur through guided participation, which takes a unique form in SSE, when there is no designated goal and participants do not necessarily share the same definition of the situation. Just as in structured activities (e.g., dressing and solving a puzzle), in SSE, guided participation entails observing others engage in other games, gradually engaging therein. However, while in structured activities, guided participation entails abandoning former games in favor of the "correct" game, in SSE, participants may continue engaging in other games.

Another important aspect of SSE's nature concerns the situatedness of learning. SSE's accidental nature affords authentic sense-making modeling, wherein the "expert" can genuinely exhibit wonder and interest, inquiry behavior, and other scientific practices and inclinations. Such authenticity is harder to obtain in designed engagement (e.g., in classrooms or science centers), when the adult usually knows the answers in advance and is only pretending to play the scientific game (Tal & Morag, 2007). Additionally, in SSE, children may pursue their own queries, rather than pretend to engage in others' queries or try to guess the desired (prescribed) answer to a pretend question, as is often the case in the classroom setting (Dillon, 1982).

## Implications

The parental role in family SSE entails employing whatever expertise the parent has to model authentic scientific practice and inclination without imposing it on the children, thus allowing them to participate in multiple games. Achieving such a balance is a delicate endeavor, sometimes counter-intuitive requiring self-restraint; however, it may be essential to the maintenance of SSE. This raises questions regarding the cultural and social resources parents need in order to be able to productively support children's SSE.

Time is another important resource in SSE. Children of middle-class families are increasingly engaged in tightly scheduled, organized, extracurricular activities (such as science clubs) rather than in unstructured activities (such as outdoor free play) (Lareau, 2011). This study provides an example of the affordances of children engaging in unstructured activities, and suggests that they may be productive when an adult is around to model (not teach), but also when there is plenty of time.

Finally, this study expands Rogoff's (1993, 2008) notion of guided participation by: (a) describing what it may look like in activities that do not entail a designated goal; (b) illustrating how it advances learning not only in non-academic activities (such as dressing), but also in scientific ones.

## Limitations and future research

In this study, through self-ethnography, I present and analyze an account of naturally-occurring family-based SSE. Self ethnography's affordances and constraints were shortly discussed in the methods section. Yet additional research exploring SSE in other families, from differing cultures and socio-economic backgrounds, with children of various ages, will shed light on differing patterns of family-based SSE and on issues such as parents' role. More work is also required to investigate SSE without adults' involvement, as well as other aspects of SSE, such as power relations, roles, and identity. In addition, longitudinal studies, which track changes in SSE and in associated structured engagement (e.g., in school), will teach us more about the long-term consequences of SSE. Also, exploring children's SSE as they mature, and portraying SSE trajectories across the life span is recommended.

If we agree that science learning is not restricted to designed environments, and that we are surrounded by opportunities for serendipitous science engagement, it then incumbent upon us to attempt to expand our understanding of such learning. Better understanding of SSE will enable us to better support it, or at least not to interrupt it. This study offers a first step toward such understanding.

## References

- Alvesson, M. (2003). Methodology for close up studies—struggling with closeness and closure. *Higher education, 46*(2), 167-193.
- Bell, P., Lewenstein, B., Shouse, A. W., & Feder, M. A. (Eds.). (2009). *Learning Science in Informal Environments: People, Places, and Pursuits*. National Academies Press.
- Bissex, G. L. (1985). *GNYS AT WRK: A child learns to write and read*. Harvard University.

- Bricker, L. A., & Bell, P. (2014). "What comes to mind when you think of science? The perfumery!": Documenting science-related cultural learning pathways across contexts and timescales. *Journal of Research in Science Teaching*, 51(3), 260-285.
- Blommaert, J. (2005). *Discourse: A critical introduction*. Cambridge University Press.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational researcher*, 18(1), 32-42.
- Crowley, K., & Jacobs, M. (2002). Building islands of expertise in everyday family activity. *Learning conversations in museums*, 333-356.
- Dillon, J. T. (1982). The effect of questions in education and other enterprises. *Journal of Curriculum Studies*, 14(2), 127-152.
- Goodwin, M. H. (2007). Occasioned knowledge exploration in family interaction. *Discourse & Society*, 18(1), 93-110.
- Fleener, M. J., Carter, A., & Reeder, S. (2004). Language games in the mathematics classroom: teaching a way of life. *Journal of curriculum studies*, 36(4), 445-468.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, 74(1), 59-109.
- Lareau, A. (2011). *Unequal childhoods: Class, race, and family life*. Univ of California Press.
- Long, S. (2004). Passionless Text and Phonics First: Through a Child's Eyes. *Language Arts*, 81(5), 417.
- Ochs, E., Taylor, C., Rudolph, D., & Smith, R. (1992). Storytelling as a theory-building activity. *Discourse processes*, 15(1), 37-72.
- Rampton, B. (2007). Neo-Hymesian linguistic ethnography in the United Kingdom. *Journal of Sociolinguistics*, 11(5), 584-607.
- Rogoff, B. (2008). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. *Pedagogy and practice: Culture and identities*, 58-74.
- Rogoff, B., Mistry, J., Göncü, A., Mosier, C., Chavajay, P., & Heath, S. B. (1993). Guided participation in cultural activity by toddlers and caregivers. *Monographs of the Society for Research in Child development*, i-179.
- Schoenfeld, A. H. (1985). *Mathematical problem solving*. Orlando, FL: Academic press.
- Sfard, A. (2001). There is more to discourse than meets the ears: Learning from mathematical communication things that we have not known before. *Educational Studies in Mathematics*, 46(1/3), 13-57.
- Tal, T., & Dierking, L. D. (2014). Learning science in everyday life. *Journal of Research in Science Teaching*, 51(3), 251-259.
- Tal, T., & Morag, O. (2007). School visits to natural history museums: Teaching or enriching?. *Journal of Research in Science Teaching*, 44(5), 747-769.
- Wertsch, J. V. (1979). From social interaction to higher psychological processes. A clarification and application of Vygotsky's theory. *Human development*, 22(1), 1-22.
- Wittgenstein, L. (1953). *Philosophical Investigations* Oxford. England: Blackwell.
- Yoon, B. (2012). Junsuk and Junhyuck Adolescent Immigrants' Educational Journey to Success and Identity Negotiation. *American Educational Research Journal*, 49(5), 971-1002.