Co-constructivism in Educational Theory and Practice

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Abstract

Though it is widely accepted that learning is a constructive process, it is also a social activity. People should not be considered as solo learners, but as interacting with each other and as being shaped through collaboration and discourse. The basis of personal development, therefore, is not isolated construction of knowledge, but rather its coconstruction in a socially shared, cultural space. While classrooms, consequently, should develop from aggregations of solo learners to communities engaged in dialogues and collaborative learning, the teachers' role extends from direct instruction to adaptive guidance and scaffolding of students.

Ever since Piaget's dynamically Kantian epistemology (Piaget, 1925, 1975), it has been widely accepted as a pervasive assumption that learning is a constructive process. In contrast to the epistemological assumption of empiricism that what we know is a direct reflection of ontological reality, learning is considered as an active construction of knowledge. Learners, as they strive to make sense of their world, do not passively receive stimulus information matching independent physical structures, but genuinely interpret their experience by (re)organizing their mental structures in successive cycles of assimilation and accommodation, while *interacting* with the physical and symbolic environment. According to Piaget and most of his successors in cognitive, developmental, and educational psychology, this process of adaptive and viable reality construction is enabled and constrained both by biologically grounded structures (the strength and scope of which, however, are not yet well known) and by the already existing prior knowledge (concepts, operative schemas, and structures) of the individual.

Even though the constructivist assumption makes some traditional problems in both psychology and education easier to solve, it also raises some new ones. An important problem is how we can think of achieving intersubjectivity while individually constructing meaning and knowledge. How can individuals who personally build their knowledge independently of each other come to the same or similar cognitive structures and common world views? How can we *share the* knowledge of our culture if people are conceived of as being solo learners, and socially isolated Robinson Crusoe figures?

The answer to this seminal question, challenging traditional (Western) epistemological constructivism which is foremost based on the concept of individual learning and learners, stems from symbolic interactionism (Mead, 1934) and from the explanatory framework of sociocultural theory (Vygotsky, 1962). It claims that the minds of human beings are fundamentally social products and that learning is a *social activity*. Learning and enculturation are not bounded by the individual brain or mind but are intrinsically social endeavors, embedded in a society and reflecting its knowledge, perspectives, and beliefs. People construct their knowledge, not only from direct interaction with the physical world and personal experience, but also from interacting with each other, including being told by others and by being shaped through social experience, collaboration, and discourse. The basis of personal development and enculturation, thus, is not the socially isolated construction of knowledge, but its coconstruction in a social and cultural space. Or, as Bruner puts it: "Most learning in most settings is a communal activity, a sharing of the culture. It is not just that the child must make his knowledge his own, but that he must make it his own in a community of those who share his sense of belonging to a culture" (Bruner, 1986: p. 86). Knowledge, from this perspective, is no longer seen as solely residing as a kind of possession in the head of each individual, but as being created and shared by communities, and distributed across individuals whose coordinated joint commitment to shared goals, mutual interactions, and continual (re)negotiation of meaning determine decisions, the formation of concepts, and the solution of problems.

Concept and Process of Coconstruction

No precise and widely accepted definition of the concept and process of coconstruction can be found in psychological or educational literature. What has been provided is very diverse and depends on the theoretical context in which it is embedded. Differences can be found with regard to at least three aspects:

1. the social type of discourse eligible to be called coconstructive: mother–child dialogue, peer interaction, teacher–student interaction, problem solving in pairs, learning in teams or learning communities, computer-supported collaborative work;
2. the psychopedagogical processes involved in productive coconstructive activity: productive dialogue such as exploratory talk and collective argumentation, collaborative negotiation after sociocognitive conflict or as a process of reciprocal sense-making, joint construction of a shared understanding, elaboration on mutual knowledge and ideas, giving and receiving help, instructional dialogue with a teacher or expert, tutoring and scaffolding;
3. the expected outcomes of collaboration: taken-as-shared individual vs. socially shared cognitions; convergence and intersubjectivity; academic task fulfillment, student motivation, and conceptual development; effects on skills in listening, discussion, disputation, and argumentation.

Common to most theoretical contexts of coconstructivism is the implication of some kind of social interaction, collaborative activity and, through joint patterns of awareness, of seeking

some sort of convergence, synthesis, intersubjectivity, or shared understanding, with language as the central tool and mediator for the negotiation of meaning. Theorists, moreover, largely converge in the adopted methodology of microgenetic analysis that has been used to examine the inherently fragile processes of coconstruction.

Piagetian Perspectives: The Role of Sociocognitive Conflict

In a (Neo-)Piagetian framework, genuine dialogue becomes possible and facilitates the individual cognitive construction of operational structures when children are able to take other persons' points of view into consideration (decentration) and when they are able to resolve socio-cognitive conflict. The early Piaget (2000) in particular regarded social interaction, – specifically, peer interaction – as a significant factor in individual cognitive development: "Criticism is born of discussion and discussion is only possible amongst equals" (2000: p. 409). According to later experimental studies carried out by coworkers of Piaget (e.g., Doise and Mugny, 1984; Perret-Clermont et al., 1991), social factors, such as the need to deal with conflicting perspectives in the context of pair or small group problem solving, can have a productive impact on cognitive behavior. In a Piagetian conservation task, for example, pupils more easily progressed to a subsequent level of development after having been confronted with contradictory judgments put forth by an adult or another child.

Vygotskian Perspectives of Coconstruction

In Vygotsky's cultural–historical and sociocultural view of the development of the 'higher mental functions' – viz., thinking, reasoning, and understanding – as a process of meaningful appropriation of culture, the interactive foundation of the cognitive is at the core of the developmental process. In contrast to Piaget's view, however, "the constructivist principle of the higher mental functions lies outside the individual – in psychological tools (such as 'language') and interpersonal relations" (Kozulin, 1998: p. 15). According to Vygotsky's claim that interpersonal interactions on a social plane serve as prototypes for intrapersonal processes, i.e., for functions to be internalized, coconstruction can be seen as (asymmetrical) adult–child interaction, or interaction between a child and a more advanced and capable peer or member of the society, in the 'zone of proximal development.' "What a child can do today in cooperation, tomorrow he will be able to do on his own" (Vygotsky, 1962: p. 87). The quality and development of higher order thinking is prepared by the coconstructive patterns and distinctive properties of social interaction encompassing guidance and contributions from experts or peers. Meaningful new learning emerges by embedding mental functions (like logical argumentation, proof, reflection, or problem solving) into specific forms of goal-directed interaction and dialogue, where more knowledgeable individuals adaptively tailor a task and provide cultural tools and resources in such a way that a child can successfully coperform it. The acquisition of a new concept or mental function becomes progressively more skillful as the child – in a process of apprenticeship and appropriation – learns to respond in gradually more sophisticated and personally more meaningful ways to the coconstructive, sense-mediating context of adult regulations, and eventually takes over responsibility for his or her own learning.

Perspective of Situated and Socially Shared Cognition

Situated learning theory views human cognition as being embedded in and inseparable from specific sociocultural contexts and its resources for sense-making. The goal of learning is to enter a community of practice and its culture, i.e., to learn, like an apprentice, to use cultural tools, artefacts, technologies, and rituals as practitioners and skilled members of society use them (Brown et al., 1989; Greeno et al., 1998; Rogoff, 1990; Lave and Wenger, 1991). As a process, learning takes place through the interaction and transaction between people and their environments. Coconstruction, from a situated cognition perspective, can be seen as involving two or more individuals who collaboratively construct a shared understanding, or a solution to a problem, which neither partner entirely and necessarily possesses beforehand (Chi, 1996). In a widely quoted definition proposed by Roschelle and Teasley (1995), "[c]ollaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (p. 70).

At the heart of this concept of coconstruction lie two coexisting activities: solving the problem collaboratively, and constructing and maintaining a *joint problem space*. Both activities require constant negotiations and recreations of meaning, i.e., trying to find out what can reasonably be said about the task in hand, and occur in structured forms of conversation and discourse, utilizing language and physical actions as their most important mediators and resources. With the use of symbolic tools, it becomes possible for the conversants to express and objectify meanings, to compare and change them deliberately, to exchange and renegotiate them with others, to build on, defend, or challenge their partner's contributions, and to reflect on the organization of judgments and arguments (see van Oers, 1996; Chi, 2009). However, as observational studies show, coconstructive learning and dialogue are hardly homogeneous but inherently fragile processes in the service of convergence and mutual intelligibility. The achievement of a shared conceptual structure cannot be reliably predicted, nor does the iterative construction of a joint problem space through cycles of displaying, confirming and repairing occur by simply putting two students together. As Roschelle and Teasley (1995: p. 94) remark:

> [s]tudents' engagement with the activity sometimes diverged and later converged. Shared understanding was sometimes unproblematic and but oftentimes troublesome. The introduction of successful ideas was sometimes asymmetric, although it succeeded only through coordinated action. These results point to the conclusion that collaboration does not just happen because individuals are co-present: individuals must make a conscious, continued effort to coordinate their language and activity with respect to shared knowledge.

Context of Linguistic Discourse Analysis

From the perspective of communication and conversation analysis, coconstructive learning requires individuals to

collaboratively establish, exhibit, maintain, and update some degree of mutual understanding. Its accountability is granted "through a plurality of displays, claiming and demonstrating understanding thanks to the mobilization of linguistic and embodied resources at specific sequential positions" (Mondada, 2011: p. 550). One of the processes by which this is accomplished between individuals is called *grounding* (Clark and Brennan, 1991). Grounding as a basic form of collaboration means the moment-by-moment coordination and synchronization of the content-specific as well as the procedural aspects and steps of coconstructive activity. There is no need, however, to fully ground every aspect of an utterance in communication. Clark and Brennan (1991: p. 148) frame a pragmatic criterion for establishing common ground: The conversants "mutually believe that they have understood what [they] meant well enough for current purposes." Thus, the techniques that are used for grounding are shaped by the goal and the medium of communication. That is, the criterion of grounding and the techniques exploited for its maintenance dramatically change according to the purpose of communication (e.g., planning a party, swapping gossip, or gaining deep understanding) and the constraints of its medium (copresence, audibility, simultaneity, and visibility in face-to-face communication; sequentiality and reviewability in written communication, e-mail, or computer-supported collaborative work).

Pedagogical Concepts of Coconstruction and Its Facilitation

An important aspect of concern for the social nature of learning – and for a pivotal way in which it is supported by culture – is instructional dialogue or conversation. This term refers to a discursive activity in classrooms that permits the coconstruction of meaning between teachers and students, tutors and tutees, the more and the less experienced, and between students. Probably, the most important feature of a culture of coconstruction in the classroom is dialogue as opposed to, e.g., solo learning and teacher monologues. Emphasis on joint learning and instructional conversation among peers, and between teachers and students, is associated with the internal mediating processes that are essential for an understanding of how coconstruction through discourse operates and influences outcomes. The pedagogical cultivation of processes such as negotiation of meaning, reciprocal sense-making, revising one's cognitions in situations of sociocognitive conflict, precise verbalization of reasoning and knowledge, listening to others' lines of argumentation, tuning one's own information to that of a partner, lending and receiving help, or modeling cognitive and metacognitive activities to be internalized by the participating individuals should, thus, be placed at the core of instructional design.

Teacher–Student Talk: Tutoring and Scaffolding

Tutoring is commonly defined as a situation in which a more knowledgeable and skilled person (in the classroom typically the teacher) provides one-to-one support to a student. Consistent with Vygotsky's theory of the constructive role played by adults in children's knowledge acquisition, the teacher's goal of

assistance can be seen as trying to get the students to share his or her understanding and knowledge. Because of the asymmetrical distribution of knowledge between teachers and students, understanding might be expected to be less jointly constructed in tutorial dialogues than it is observed to be in peer dialogues. Actions that tutors or teachers can take in order to elicit responses, including some coconstructive behavior from a tutee, are described in literature on tutoring (e.g., Chi et al., 2001; Graesser et al., 2012) and cognitive apprenticeship (Collins et al., 1989). They can be subsumed under two broad categories: (1) modeling, scaffolding, and fading as content-specific ways of providing hints, strategies, and situational forms of coaching and guidance that are tailored to the needs of individual students; and (2) prompting as a more content-neutral invitation by the tutor to elicit elaborations, reflections, and self-explanations from students (Chi et al., 2001). The metaphor of *scaffolding* in particular serves as a description of a productive way of supporting student thinking and problem solving. Specifically put, the teacher helps the students make sense of a difficult task in a highly responsive way that allows as much active student participation as possible. Moreover, as Kleine Staarman and Mercer (2010) notice, "the notion of scaffolding is not merely providing a learner with help to accomplish the task, but actively and temporarily providing a learner with just the right amount of support that is geared towards bringing him or her closer to a state of individual competency" (Kleine Staarman and Mercer, 2010: p. 79).

Teacher–Student Talk: Instructional Conversations and Dialogic Teaching

A rich body of research conducted in connection with pedagogical concepts of coconstruction and its facilitation studied instructional conversation during whole-class teaching. Numerous analyses of classroom talk have shown that in most cases it is characterized by a highly asymmetric distribution of utterances in favor of the teacher, which leaves students with only few opportunities to play an actively participating and responsible role in the process of knowledge construction. Classroom talk often follows the typical pattern of IRE or IRF sequences (Mehan, 1979; Sinclair and Coulthard, 1975). Such an IRE sequence starts with a teacher question (Initiation), followed by the response of the student and the evaluation or feedback of the teacher. Usually, the majority of teachers' questions requires only brief, 'correct' answers and do not invite students to think for themselves, to generate and externalize their own ideas about the object under consideration, or to take up and examine contributions of other students. It is for this reason that there seems to be only little space left for coconstructive activities such as negotiation of meaning and reciprocal sense-making. Referring to Bakhtin's (1981) distinction between monologic and dialogic discourse, some authors deemed this structure of classroom interaction to be rather monologic than dialogic (e.g., Ford and Forman, 2006). From a sociocultural perspective on teaching and learning, however, teaching approaches which are of a more dialogic nature are required in order to foster students' deep understanding of concepts and the appropriation of cognitive and communicative strategies of the discipline being taught.

Implementing a more dialogically geared teaching approach does not mean that the teacher completely abandons his or her leading role in the discourse. Depending on the part assigned to the students and the quality of the teacher's question and feedbacks, dialogic structures are possible even within a teacher-directed setting. So, by making use of interactional moves like 'revoicing' instead of evaluating a student utterance, the teacher can position a student as "a thinker or theorizer, the holder of a noteworthy idea, or explanation" (O'Connor and Michaels, 2007: p. 281), and as an authoritative and accountable member of a knowledge building community. The distinction between monologic and dialogic discourse might therefore be too simplified, as O'Connor and Michaels notice. They distinguish two notions of dialogic discourse, namely dialogic discourse as an ideological stance and dialogic discourse considered as a linguistic discourse structure. Thus, a discourse sequence may appear rather monologic with respect to its linguistic form, but at the same time it invites students to listen to each other, to generate arguments and to negotiate a shared understanding. Mortimer and Scott (2003) pursued a similar line of argument and proposed a two-dimensional model drawing a distinction between an authoritative versus dialogic dimension on the one hand and an interactive versus noninteractive dimension on the other hand.

As research on teacher–student talk indicates, it is challenging for teachers to develop an approach to teaching which is more dialogue-oriented. Yet there are theoretically substantiated concepts and related tools available to teachers that can support such a development, for instance, 'Dialogic Teaching' (Alexander, 2008), or 'Accountable Talk' (Michaels et al., 2008). Both concepts provide teachers with a collection of concrete recommendations and strategies or tools that can support the implementation of a more dialogic culture of interaction in the classroom.

Student–Student Talk: Collaborative Learning and Patterns of Dialogues

Student–student talk during a collaborative learning activity is perhaps the most obvious example of knowledge coconstruction in the classroom. In this context, collaborative learning is defined as an activity in the course of which "participants are engaged in a coordinated, continuing attempt to solve a problem or in some other way construct common knowledge" (Mercer and Littleton, 2007; see also Section Perspective of Situated and Socially Shared Cognition). In contrast to teacher–student talk, student collaboration is usually characterized by a (more or less) symmetrical relationship between the participants as regards hierarchy and knowledge level. In pursuing different theoretical perspectives on coconstructivism (see Sections Piagetian Perspectives: The Role of Sociocognitive Conflict; Vygotskian Perspectives of Coconstruction; Perspective of Situated and Socially Shared Cognition; and Context of Linguistic Discourse Analysis), research on the processes of collaborative learning has put forward several descriptions of patterns which guide productive student–student talk in the course of which both partners substantially contribute to a topic in a relatively equal and balanced way. One of the most prominent concepts in

this regard is exploratory talk (as opposed to disputational and cumulative talk; Mercer and Littleton, 2007), which is characterized as "constructive and critical negotiation of views, offering constructive criticism and building on challenges and counter-challenges" (Vass and Littleton, 2010: p. 113). Exploratory talk is likely to incorporate other characteristics reported in the literature, such as regulation of sociocognitive conflicts, argumentation, or giving and receiving elaborated explanations (see also Webb, 2009). Another concept of productive student–student talk refers to patterns of joint dialogues (Chi, 2009) "which occur when both peers make substantive contributions to the topic or concept under discussion, such as by building on each other's contribution, defending and arguing a position, challenging and criticizing each other on the same concept or point, asking and answering each other's questions" (p. 82f).

Quite a lot of both theoretical and empirical work has addressed the processes that underlie dialogues and the conditions under which collaborative interaction is most likely to occur, and a whole range of possible ways to enhance its quality has been provided. Among the input characteristics that exert a complex influence upon the quality of interaction are: the preparation of the students for collaborative learning (including training for cooperation and discourse prior to the collaborative learning event), the establishment of a culture of dialogue and of problem-based learning, group characteristics (composition, size, ability, and sex), the goal and incentive structure of the task, and the structuring of group interaction (see, for reviews Chi, 2009; Vass and Littleton, 2010; Webb, 2009).

The question as to how dialogues can be elicited is quite important and needs to be considered in this connection. Beyond simply letting students work together in pairs – which is a means to be located on the surface level of instruction – an effective way of improving the quality of collaborative thinking is the explicit structuring of the interaction. Examples are scripted collaboration, 'Reciprocal Teaching' (Palincsar and Brown, 1984) or 'Guided Reciprocal Peer Questioning' (King, 2008). A commonality all these techniques share is the fact that a set of cognitive and metacognitive strategies (e.g., sentence openers, posing questions with generic prompts, instructing students how to proceed in a dialogue; see Chi, 2009), which have to be applied in a more or less prescribed way, is provided. Another possibility for making learning environments more supportive for collaborative activities is to enrich them with technology. Well-designed *computer-based cognitive tools* provide users with both process-related and task-related means for thinking and communication, irrespective of whether they are to be applied in face-to-face or computer-mediated interaction. Functioning as mediating resources and cognitive tools for the representation, negotiation, and modeling of concepts and activities, educational software has the potential – by making conceptual structures and processes visible, accessible, and manipulable on a computer screen – to facilitate processes of sharing understanding, of achieving convergence and intersubjectivity and of argumentation (e.g., Noroozi et al., 2012; Reusser, 1993).

Although collaborative learning emphasizes the joint construction of knowledge among students, the teacher has still an important role to play. In relation to the coconstructive activities of learners this role can be described within the

didactic framework of 'cognitive apprenticeship' (Collins et al., 1989). According to the ethnographic model in which practices and principles of traditional craftsmanship are applied to cognitive learning activities, teachers, experts, or more capable peers provide guidance and support to learners as they participate as apprentices in authentic and task-related, structured social interactions. As opposed to a transmissionist view of instruction, teachers should provide aid in the intellectual development of students in ways that leave room for negotiation and joint expansion of meaning: (1) as scaffolds and role models for the behavior that students are expected to engage in; (2) as active participants in learning groups aiming at shaping the group's dialogue; (3) as monitors of coconstructive norms in social interactions in which negotiation of taken-as-shared meaning is essential (Webb, 2009); (4) as advocates of content-specific standards and of the achievement of convergence and intersubjectivity in understanding and problem solving.

Associated with this shift in the pedagogical orientation of teachers is a shift in the role of learners and the organization of classrooms. In the wake of a view that sees learning essentially as sociocultural interaction, classrooms should develop from aggregations of solo learners to communities engaged in coconstructive learning. That is, individuals should become acculturated members of a culture and community through collaboration and negotiation. Or, as Bruner (1986: p. 123) has put it: culture as "a *forum* for negotiating and renegotiating meaning and for explicating action … is constantly in process of being recreated as it is interpreted and renegotiated by its members."

> *See also:* Apprenticeship and School Learning: Lessons from Germany; Communities of Practice; Cooperative Learning in Schools; Instructional Design; Learning and Instruction: Social-Cognitive Perspectives; Piaget's Theory of Human Development and Education; Situated Learning (Learning In Situ); Social Constructivism; Vygotsky's Theory of Human Development and New Approaches to Education.

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