

Learning and Instruction: Social-Cognitive Perspectives

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Social interaction, Sociocognitive conflict, Sociocognitive activities, Sociocultural approach, Mastery goals, Argumentation, Dialogical processes, Classroom learning, Teacher's role, Experimental social psychology, Levels of analysis.

Abstract

In this paper, we try to expand the lenses classically used in social psychology of development, and in particular, in the post-Piagetian tradition, to recent contributions of social and cognitive dynamics in development and learning. Psychological development has to be redefined as involving socially framed, culturally mediated and interpersonally negotiated processes, and the dynamic relation between the person, others, objects and instruments which are reconfigured through teaching-learning activities. The units of analysis, besides the traditional focus on the individual and/or isolated cognitive event, also includes nowadays peer interaction and partners' roles, dialogical processes, argumentation, and specific institutional features of human practices, as illustrated through experimental social psychology. According to this general framework, learning and thinking appears more clearly as the collaborative result of autonomous minds confronting viewpoints and cultural artifacts (tools, semiotic mediations, tasks, division of roles) and trying to manage differences, feedbacks, and conflicts to pursue their activities. Moving from one activity to another, and from one space to another (pretest, joint activity, posttest), children have to reorganize their understanding, their language, and the organization of their social interactions.

From Individual to Collective Levels: The Social and the Psychological in Intellectual Development

In discussions about learning in the 21st century, there is a need for a better understanding of processes at the individual as well as at the collective level. At the same time, theoretical frameworks for learning have undergone several paradigm shifts from 'cognitive revolution' to more recent, various socio-cultural approaches that have an increasingly greater impact in research and in the wider discussion as well. The units of analysis, besides the traditional focus on the individual and/or isolated cognitive event, nowadays includes peer interaction, dialogicality, argumentation, roles of partner, and various institutional features of human practices. Another major issue is the status of knowledge in information society that, according to Engeström and Middleton (1996, p. 2), can be analyzed either by agency-driven microsociology-without-history or by historically relevant macrosociology-without-agency. A third way might be sociocultural approaches where human agency is a starting point and micro-macro-cultural dynamics are included as far as they become relevant for understanding the activities participants perform in situ and over time.

In fact, the fruitfulness of interplay between 'the social' and 'the cognitive' was recommended a long time ago by Lévy-Bruhl who, according to Luria (1976), was among the first scholars to point out the qualitative feature of primitive thought and to treat logical processes as products of historical development.

As Moscovici (1990) suggests, there are at least two ways of approaching the interplay between 'the social' and 'the cognitive' (i.e., between social and cognitive or developmental psychology) or, in other terms, how deeply social relations and social changes are accompanied by profound transformations of thought, with regard to the appropriation of cognitive instruments both in children and in adults.

The 'Bartlett way' recommends the comparison of representations and beliefs of groups situated at different levels of evolution. In particular, Bartlett (1928) reminds us that the best introduction to the understanding of the social dynamics of cognitive constructions is to compare the novices and the experts within their own field or culture and not to compare the primitive and the ordinary member of a modern social group. Thus, the main aim of cognitive social psychology must be to carefully describe the modern and the normal in their milieu and in relation to topics which are significant for their common life.

A complementary contribution to this way can be found in Cattaneo's work (1864) about the crucial role interpersonal and group conflicts play in producing mental phenomena and mental organization.

The 'Vygostkian way', which is also that of Piaget, passes through the child as the equivalent of a simpler or primitive and younger culture, and follows the child's development. This way therefore postulates that the social nature of human cognition appears in the individual's interiorization of social experiences. Progressively, as this process develops by a sort of causal spiral between social experiences and new cognitive tools, we can grasp the operations through which the people's consciousness is articulated with that of their partners and with the culture of which they are a part of.

Following these two different traditions, it is recommended that research in development and learning become an anthropology of the modern world, while developmental and learning psychology can be seen as the as two tools for documenting the ontogenesis of the modern child.

After being separated almost to the point of losing all contact with each other, learning and developmental psychology are beginning to return to a shared line of research, which was the very starting point of developmental psychology, as Baldwin (1913) maintained: According to this author, the individual is not socialized by society, but society individualizes itself in different individuals; or in other terms, society expresses itself continuously through each single individual.

Shifting the Paradigms: From the Individual to the Societal

Studies on learning have been undergoing gradual paradigm shifts, ~~gradual shifts of paradigms~~, from the overemphasis of the biopsychological functioning of the individual learner, where failure is ~~necessarily~~ seen as a sign of incompetence, to taking into account other social factors, either in a perspective inspired by Lewin's notion of *psychological field* or in a more macro-sociological approach. Notably, the latter has called attention to major social problems surrounding the discrepancies in learning performances in school pupils according to their social position (socio-economic background, gender, ethnicity), educational methods and their hidden curriculum, the streaming structure of school institutions, etc., and differences

between the same subjects' performances in and out of schools. At the psychosocial level, evidence has pointed to field effects on performances: Since Orne's pioneering work in 1962, many studies have shown that the assessment of the subjects' competencies is affected by social factors such as the linguistic, motivational, and attributional factors, as well as with identity characteristics of the subjects, teachers' expectations, individual and public dimensions of the situation, and the climate of co-operation or competition. The rather controversial results of these studies (see below) have called for a more integrative theoretical framework, articulating the various levels of analysis from the individual to the societal, in order to take into account the ways in which these factors interact, relying upon precise descriptions of the networks of socio-cognitive processes within which subjects think, behave, and learn (e.g., in the laboratory, at home, at school, on the street) and observations of the impact these experiences have on individual and collective cognition.

This has led to a new shift from determinism to constructivism and from product-oriented studies to process-oriented ones. Studies have focused on the interdependency between successful formal learning in schools and family socialization, and closer attention has been paid to the teacher's role in defining precise expectations and giving adequate feedback to the students, on the one hand, and to the communication modes and patterns elicited in the learning and testing situations on the other hand.

Learning as a Sociocognitive Activity: The Essential Role of Partners

It has been established that interaction, in order to be instructive, does not always have to be between a child (or novice) and an adult (or teacher/expert), but it can be just as effective if it takes place between equally novice peers, given a certain number of conditions and for certain tasks (see below § CCC). But this called for detailed studies on the influence of social interaction on the appropriation of cognitive tools. Three generation waves of research could be documented since the early seventies (Carugati and Gilly, 1993; Psaltis et al., 2009). Recovering the importance of conflict both in social and in developmental psychology, the notion of *sociocognitive* conflict (Doise et al., 1975; Doise and Mugny, 1984; Mugny et al., 1984) was introduced in order to stress the effect of the simultaneous confrontation of different individual perspectives or points of view during social interaction that necessitates and gives rise to their integration within a new

cognitive organization. In the same vein, the notion of *social marking* (i.e., the representations of social rules pertinent to the cognitive rule for correctly solving the task - conservations of space and respect for the asymmetry of social positions between child and adult) allows showing the positive influence of societal dynamics on cognitive progress, even in the absence of direct interaction with a partner. The importance of social relations and norms as a symbolic order giving meaning to the everyday practices at school becomes apparent here, and is manipulated in order to study how symbolic order mastered by children might be effective in building cognitive tools.

The Contribution of Experimental Social Psychology of Cognitive Instruments

Developmental social psychologists have stressed the social nature of conflict. They propose that interindividual conflicts are essential for the stimulation of cognitive development. These conflicts are sociocognitive and positive for individual cognitive progress under the conditions that they involve confrontations with a partner proposing a different solution to the same problem. Some conditions are described in terms of both prerequisites and of constructive/obstacle outcomes to the confrontations.

Two levels of prerequisites are illustrated by Mugny, De Paolis, and Carugati (1984). These concern cognitive competence (some basic cognitive organization is required) and social competence (some abilities to communicate and to interpret information).

Constructive confrontations are promoted by arranging tasks in such a way that different points of view are possible and can be confronted, even when an incorrect response is proposed by a partner (*ibid*, *em*). Another useful strategy is to encourage controversy in pro-con issues while stressing the cooperative context (Johnson & Johnson, 2002).

Obstacles to constructive confrontations are involved when the dynamics of communication conflict do not prevent both partners from solving the problem through a relational compromise: compliance with the more assertive partner, social comparison, competition/ avoiding competition, threatening partner's competence, activating demonstration of performance instead of mastery.

Summing up, ample research has shown that the effect of socio-cognitive conflict depends highly on the situation in which it takes place (for reviews, see Buchs et al., 2004).

Conflict could lead low-competent participants to an improvement in their reasoning strategies, unless a competence-threatening competition was introduced. Along the same line, it was shown that conflict between high-competent participants led to trying to defend and protect one's own self-competence and rejecting the other's point of view—with disruptive effects on reasoning—unless competition was hindered (Buchs and Butera, 2009). Other research demonstrated that students could learn from a disagreement with an expert (Carugati and Mugny, 1985; Quiamzade, 2007). However, if the latter makes them feel incompetent, this results in a superficial compliance without deep learning. Another line of research has demonstrated that in a context enhancing mastery goals (i.e., improving one's knowledge, to learn), conflict was beneficial for learning whereas in a context enhancing performance goals (i.e., demonstrating one's ability), it was not (Darnon et al., 2007).

What, in these situations, changes the effects of a conflict? According to some authors, these situations are characterized by the fact that they do or do not threaten self-competence (Buchs and Butera, 2009). For these authors, two types of conflicts can be distinguished: In a context in which self-competence is not threatened, the conflict can be *epistemic*, namely, it can be focused on the question of knowledge. This kind of conflict leads individuals into rethinking the issue, examining the validity of different propositions, and trying to understand the problem. This can result in high level cognitive processes and improvement in learning. However, if self-competence is under threat, individuals focus their attention on the question of self-competence protection instead of learning, and the benefits of the conflict are lost. Authors qualified this type of conflict as a *relational* conflict, thus echoing previous research with children (Mugny et al., 1984).

In conclusion, the significance of social psychological contributions to learning and instruction and in a wider sense, to educational research appears fully grounded, even in the framework of social influence processes as a grid, to approach the complexity of educational dynamics. There is evidence that social influence *stricto sensu* is relevant for such dynamics. Students, but also teachers, are continuously faced with social interactions in which a given source tries to convince them to change their beliefs, attitudes, or

behavior. The empirical works consistently show that the outcome of such encounters largely depends on a regulation that is sociocognitive or relational in nature, leading to learning and development in some cases, or to resistance in others.

It is also useful to define social influence processes *lato sensu*. This allows considering a larger variety of processes through which the social context modifies dynamics relevant to learning instruction and educational settings. For instance, the negative (but also positive) impact gender stereotypes may have on performance is exemplary to this respect, as are the multiple and reciprocal influences between teachers and pupils or students in the classroom. In all these cases, pupils, university students, and teachers regulate their motives, beliefs, attitudes, and reasoning as a function of relevant social knowledge or information that is made salient in the context.

What is also clear is that the most meaningful knowledge that steers such regulations in one direction or another is the one that is relevant to self-competence. This is partly due to the fact that the social hierarchy is at least partially legitimized by a hierarchy of competence. Those who are more competent have a basis from which they can argue that they should be on top of others. In turn, this may explain why negatively stereotyped gender/groups may feel an identity threat that undermines their performance or learning. Also, scholastic judgments are guided by social utility, and social utility is determined by the demonstration of both intellectual or academic success and conformity to social norms (e.g., internality). In all cases, identity stakes are aroused by the social salience of the competence level expressed by performance.

Social Interaction as Dynamic and Dialogical Processes

Recent advances in this area have drawn specific attention to the dialogical dimensions of thinking skills. Given that neither thinking nor context is a static reality, each affects the other via its authors' and participants' initiatives and interpretations. Joint actions and thought sharing (via language and semiotic mediations) are dynamic processes likely to be productive for knowledge creation and learning in the individual and in groups. Dynamic processes do origin on verbal interactions and collaboration. Tartas et al. (2010) contribute to summarize the studies aimed at clarifying an unresolved issue from the study of Grossen

et al. (1993), i.e., the apparent failure of adult training to generate progress in the posttest of adult-trained children.¹ The overall results are interesting (Tartas et al., 2004). From a cognitive point of view, social interaction with a more advanced peer was as efficient as a condition/sequence consisting of child-centered adult training followed by interaction with a novice peer. From a social point of view, the authors observed that these horizontal relationships between peers offered the novices opportunities for progress.

The results show that there were no major differences across the experimental and control conditions, except for the adult-trained children: they changed level significantly more than other groups. Theoretically stated, it has been shown that there are two kinds of competencies possibly acquired by children even after the same adult training: surface or deep. Deep competencies are acquired when children do not simply internalize the semiotic means offered by the adult, but when they engage in a more profound appropriation of the same means through thinking at the higher level.

Children diversely interpret the social role allowed by the experimenter. Some children are doing things their own way, for instance, autonomous but not very social. They have a limited understanding of what the experimenter means by 'working together'. Some other children seem to have understood that they had to learn to role-play what the expert-adult had done during phase II and to behave as such in front of their peer. However, some children misunderstood the adult's intents and they played the role of unqualified observers, and not the role of qualified observer and helper that the adult had taken.

The relationship to the peer was also diversely understood by children. Some limited themselves to expressing their own point of view while others looked at their peer partner's production and commented on it. They participated in a real dialogue with the peer, they started gaining resources that allowed them an opportunity to try out during the peer activity what they had learned with the adult, eventually then master it and reuse it successfully at the individual posttest phase. The instructions given by the adult were the same, but the 'thinking spaces' children constructed were quite different, probably because in front of this "brunerian" adult who was scaffolding their activity (enrolling them in the task, alleviating difficulties,

¹ The design was the same as Grossen *et al.* (1993). 100 children took part, 46 of whom formed the control condition (pre- and posttest sessions: phase I and IV). Two other experimental conditions were organized. Condition 1: the novices went through phase I (individual pretest), II (adult training), III (joint activity), and IV (individual posttest). During phase III they were asked to perform a joint activity with a novice (not knowing that the partner was a novice). Phase IV was a posttest similar to phase I. Condition 2: children were not trained by the adult. They only went to the phases I, III, and IV. In the joint activity, the dyads always comprised a novice and an expert: The expert could either be an expert diagnosed as such at the pretest (condition 2) or a child who has become an expert via adult training (condition 1). In phase II, a third of novices were trained by an adult in a way that put them in an active position with opportunities to externalize their spontaneous thinking. The adult adjusted to the child when bridging academic concepts in the conversations and suggesting more advanced strategies. The intention was to enable the child to appropriate a specific kind of talk about the task (Kohs cubes) via granting agency to the learner trying to adjust the support to the specificity of the problems encountered in doing the task.

explicitly verbally the names of the elements and the actions undertaken, etc.) the children had understood that their duty was to make explicit their points of view and strategies.

To summarize, learning and thinking appear more clearly as a collaborative result of autonomous minds confronting viewpoints and cultural artifacts (tools, semiotic mediations, tasks, division of roles) and trying to manage differences, feedbacks, and conflicts to pursue their activities. Moving from one activity to another, from one space to another (pretest, joint activity, posttest), children have to reorganize their understanding, their language, and the organization of their social interactions.

A specific type of Social Interaction: Argumentation

Argumentation is of interest to researchers who are concerned with the social and cognitive processes that promote learning. However, learning, argumentation, and learning by arguing raises theoretical and methodological questions: How and when do learning processes develop in argumentation? Is it the case for all subjects? How does one design effective argumentative activities? How can the argumentative efforts of pupils be sustained? What are the psychological issues involved when arguing with others? How can what the learners produce be analyzed and evaluated? The argumentative activity requires specific intellectual and social skills, and it is often emotional and demanding. Introducing argumentative activities in educational settings is not yet common. It requires attention at different levels. The complex argumentation skills must be given opportunities to develop in the growing child. At the interpersonal level, argumentation means confronting other people's perspectives. People often avoid these kinds of situations, which they tend to perceive as a risk to the self and to the relationship. At the institutional level, argumentative activities are sometimes considered time consuming when curricula are already overloaded. These activities require special social skills from the teachers, as well as ad hoc teacher training and assessment practices. At the cultural level, argumentation means the acceptance that social harmony is not threatened by the expression of a plurality of opinions; that assertions have to be backed up; that authority is not sufficient; and that discussions are permitted even when relationships are asymmetrical. As a result of this complexity, it is not

possible for teachers to just improvise argumentation based learning activities in the classroom. Precise design and adaptive management are needed.

An interesting line of research is the development of argumentation theories in the contemporary epistemological scene. Rigotti and Greco Morasso (2009) consider, in particular, the pragma-dialectical approach for its focus on the theoretical kernel of the discipline and for systematically eliciting, from this, the connected methodological implications. The key notion of argument is specified by comparing it to the apparently near notion of demonstrative proof. Analogies and differences are brought to light, and the rather fuzzy but challenging and fundamental notion of reasonableness is identified as denoting the main value at stake in argumentative interactions. The authors propose a model of argumentative intervention in which argumentation is conceived as a particular type of communicative interaction. The model aims both at producing and at analyzing/evaluating argumentative interventions. The fundamental claim is that assuring the quality of argumentation implies contributing to a healthy social consensus and promoting cultural development at the individual and collective levels.

Muller Mirza, Perret-Clermont et al. (2009) examine argumentation as a psychosocial practice embedded in institutional, historical, and cultural contexts. Argumentation occurs when the conversation flow is disrupted by a disagreement, a question, or an alternative hypothesis. It is not easy to develop this peculiar communication, as it entails complex issues at the personal and interpersonal levels. Even though they are, in reality, interwoven, several dimensions are distinguished. At the cognitive and individual level, the questions include the following: what are the cognitive prerequisites for engaging in an argumentative interaction? How does the development of argumentative skills take place in children? Beyond the individual level the authors take into consideration other dimensions that are important, such as the relational and dialogical aspects of argumentation, the status of the partners, and the characteristic of the “audience.” Developmental, social, and sociocultural approaches in psychology are thus convened in order to construct a better understanding of this complex practice.

Schwarz (2009) provides multiple perspectives on the intricate relationship between argumentation and learning. Different approaches to learning impinge on the way argumentation is conceived: as a powerful vehicle for reaching shared understanding, as a set of skills pertaining to critical reasoning, or as a tool for social positioning. Each perspective has harvested empirical studies that have stressed the importance of argumentation in learning. In spite of the pluralistic stance adopted, Schwarz attempts to draw connections between the findings obtained in the different subject areas and perspectives: In mathematics, studies are presented that show deep gaps between argumentation and proof; in science, experimental studies are reviewed to examine whether and how argumentation promotes conceptual change; in history, Schwarz considers the role of argumentation in challenging narratives and in claiming a position; and lastly, the chapter describes the new wave that characterizes civic education programs geared toward the instillation of argumentative practices in democratic citizenship.

Argumentation may be a useful tool at different levels of educational systems. , According to the claim that education is a dialogic process in which both the talk between teachers and learners and the talk among learners have important roles to play, Mercer (2009) describes some classroom-based research in the primary school which has enabled teachers to encourage the development of children's use of spoken language for thinking and arguing effectively together, providing empirical support for the relationship among thought, language, and social activity, as claimed by the Russian psychologist Lev Vygotskij.

At the level of university students, Andriessen (2009) presents one case of using interactive media for supporting collaborative argumentation. The discussion is descriptive, focusing on the scenario and the tools that are used and on examples of actual discussions by students. Some basic mechanisms of employing argumentation are illustrated by students using computer tools (chat, forums, graphical tools) for producing an argumentative essay.

By drawing upon existing theoretical and empirical resources to discuss the successes and difficulties encountered in trying to introduce or sustain argumentative activities in learning settings, this approach contributes to the promotion of a large program of research. Considering argumentation as a key activity at

the heart of many developmental processes, in individuals and in society, the study of argumentation opens the way to a deeper reconsideration of teacher training, curricula, and also of the nature of human knowledge and its potential advancements.

Classroom Learning and Teacher's Role

One requirement of group tasks at primary school level is that they are controversial; that is, amenable to different perspectives. This has been confirmed in research by Cohen (1994), which compares controversial with noncontroversial tasks. However, granted the possibilities provided by controversy, further considerations are also relevant. First, research suggests that all group members must believe that both their own *and* their partners' contributions are important. According to Meyers (1997) ~~puts it,~~ "individuals exert less effort in groups when they believe that their work is not critical to the collective. By contrast, when students perceive their contributions to be original and significant, they continue to participate even if their work remains anonymous. In addition, individuals sometimes reduce their efforts to match the level at which they believe other group members are contributing. Thus, children may withdraw their participation to avoid the possibility of being exploited by 'social loafers' within the group (Liden et al. 2004). Second, it is accepted that tasks should be inherently group based and not amenable to completion by individuals working independently. What is needed is a task that requires resources (information, knowledge, heuristic problem-solving strategies, materials, and skills) that no single individual possesses, so that no single individual is likely to solve the problem or accomplish the task objectives without at least some input from others (Cheong, 2010). Third, tasks should be challenging relative to children's current level of understanding (OFSTED, 2012). With routine tasks, children tend to engage in fairly low-level thinking and interactions (Cohen, 1994). Indeed, social loafing may increase (and motivation decrease) when tasks are too easy (Liden et al., 2004).

While the need for controversy, challenge, mutual value, and group basis can be taken for granted, there is disagreement over the significance of group rewards. Slavin has argued repeatedly (e.g., 1990) that

achievement is enhanced when group members are rewarded as a group. He believes that group goals and collective outcomes provide incentives for children to help each other and to encourage each other to put forth maximum effort. However, Slavin's research has been discussed on several issues (Cohen, 1994; Bridges, 2008). It is accepted that reward can help some students, but it is not effective for all. Moreover, according to as Cohen (1994) ~~points out,~~ "offering rewards on a competitive basis, although effective in increasing motivation of team members to work together, may have negative effects on intergroup relations, more specifically on the perceptions that team members have towards other teams", or in other terms, ~~stated~~ may induce a social comparison at the intergroup/ interindividual levels and even a stereotype threat with their negative impact (~~see § 2~~).

According to Howe and Mercer (2007), research into the nuances of task design is in its infancy at present, and as it develops it will undoubtedly help to clarify why classroom dialogue remains unproductive and how this can be addressed. However, few scholars believe that the answer lies purely with the specifics of task. Over twenty years ago, Wells (1986) drew attention to difficulties with the overall *climate* of British primary schools, arguing that the *normative environment* for talk in most classrooms is not compatible with children's active and extended engagement in using language to construct knowledge.

This characterization of the classroom environment for talk is also one that emerges from more recent work by Alexander (2006). According to Alexander, classroom discourse is overwhelmingly monologic in form, as teachers typically offer children opportunities for making only brief responses to their questions.

It is interesting that Wells was writing at a time when British primary education was still heavily influenced by Plowden philosophy (cf. The Plowden Report, 1967), while Alexander was addressing a more curriculum- and assessment-led context. It appears that the forces that oppose exploratory talk transcend policy changes. However, the monologic climate of most classrooms does not fully explain why, when left to work together, children only rarely use talk of an 'exploratory' kind. As demonstrated many years ago (Edwards and Mercer 1987), the norms or ground rules for generating particular functional ways of using language in primary school – spoken or written – are rarely made explicit. It is often simply assumed that

children will pick these sorts of things up as they go along (taken for granted). But while picking up the ground rules and ‘fitting in’ in a superficial way with the norms of classroom life may be relatively easy, this may mask children’s lack of understanding about what they are expected to do in educational activities and why they should do this. What is expected in terms of behavior may be accepted without really being understood. The distinction between structures for classroom management (e.g., lining up in pairs or sitting rather than kneeling on chairs) and structures that develop learning (e.g., listening to a partner or asking a question) may not be apparent to children. Indeed, even when the aim of talk is made explicit – talk together to decide; discuss this in your groups – teachers rarely make explicit what kind of interactions they expect to take place or discuss with their pupils’ ways of using talk to engage productively in joint activities. There may be no real understanding, on the part of at least some children, of how to talk together or for what purpose. Many children may not appreciate the significance and educational importance of their talk with one another. Moreover, in the monologic environments described by Alexander (2006), they may frequently assume that the implicit ground rules in play in the classroom are such that teachers want the right answers rather than discussion.

Research has shown that, under certain conditions, interaction with peers helps children’s learning and development. The expression of different views, such as alternative explanations or possible solutions to problems among children working together, seems to be particularly useful in stimulating learning and development, and it does not seem necessarily to matter if those differences are always resolved (or resolved productively) through discussion. Children can also develop important communicative skills through interaction with their peers, which again they would not learn by only taking part in conversations with adults. But, paradoxically, observational studies have shown that collaborative talk in classrooms is often unproductive and inequitable. There is no reason to believe that even young primary school children are incapable of using exploratory talk (as they have been observed to do this in informal contexts), but they often seem not to use their skills during classroom activities.

Some studies have suggested that the design of tasks can promote the use of exploratory talk, and hence more productive interaction; but changing task design does not seem to be sufficient in itself. Others suggest that the quality of collaboration can be improved if attention is given to developing an atmosphere of trust

and mutual respect. There is evidence from intervention studies that this does lead to improved interaction and to improved learning, but the complexities of children's social histories suggest that it may not be sufficient. Other intervention studies support the view that the quality of interaction is significantly improved if children are helped to become more aware of how they use language as a tool for thinking together and taught some specific strategies for carrying on productive discussions. That research has recorded gains not only in children's use of exploratory talk and improved collaboration, but also in their individual skills in reasoning and academic attainment. Overall, it seems that children's social histories affect how they engage in collaborative learning activities, and those histories will embody their social learning both in and out of school (Howe and Mercer, 2007).

Although collaborative interactions and discussions are potentially very valuable for children's learning and development, that potential may only be realized if children are given structured guidance by their teachers on how to make the most of the opportunities that those activities offer.

In fact, evidence has amassed over the past 20 years to indicate that group work among children can support knowledge and understanding in elementary school (science classes). Group work has been promoted in many countries as a key component of teaching. Its relevance to science education is, for instance, a recurring theme of the teachers' professional journals (Howe, 2004). Nevertheless, as Howe (2009) points out, group work will never be sufficient to deliver the curriculum of a specific school subject; expert guidance is also essential. On the other hand, expert intervention can often undermine the value that group work is known to possess. One response to this debated point is to conclude that group work is trouble and valuable as well.

An approach by Howe (2009) revolves around the dynamics of *consensus/agreement* as a way to achieve positive cognitive outcome during group interaction. Several decades after the introduction of the theory of sociocognitive conflict (Doise et al., 1975; Doise and Mugny, 1982; Mugny et al., 1984) it is acknowledged in an indirect way the role of divergence of initial opinions, as a starting point for a simultaneous comparison of different individual perspectives or points of view during social interaction that might ~~rise~~—escalate—to their integration within a new cognitive organization. The key issue in Howe's research is that it requires children to discuss and achieve (or not) consensus about relevant factors during the first stage of experiments

(shadow size, rate of cooling), as a prelude to subjecting consensual vs. 'ideas people have' positions to empirical test during the second phase with the expert guidance. Besides the richness of the results, it seems worth noting that achieving consensus creates receptivity to expert guidance, ~~when causal mechanisms in science subjects~~. But a further questions are raised: It remains uncertain whether by virtue of addressing consensual positions, expert guidance is seen as serving children's needs rather than having authority over these needs, and even if this did happen, whether this was relevant for supporting children and children's outcomes, both/either at the group and/or individual level.

Summing up, when studies highlighting the challenge posed by expert guidance in group-based work with children about science subjects have been reviewed (Webb, 2009), they uncover multiple dimensions of the expert's role in fostering beneficial group dialogue, including preparing students for collaborative work, forming groups, structuring the group-work task, and influencing student interaction through teachers' discourse with small groups and with the class. Common threads through the research are the importance of students explaining their thinking, and teacher strategies and practices that may promote student elaboration of ideas. In conclusion, teachers have many roles to perform when using small-group work in the classroom, including preparing students for collaborative work, making decisions about the group-work task and the composition of groups, making decisions about the structure and requirements of group work, monitoring groups' functioning and intervening when necessary, and helping groups reflect on and evaluate their progress.

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