

ORACY, LITERACY, CONCEPTUAL MAPS AND ICT AS MEDIATORS OF THE SOCIAL CONSTRUCTION OF KNOWLEDGE AMONG PEERS

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ABSTRACT

In this paper we provide an account of how primary school children collaborated over time to develop a team project, which involved the joint construction of knowledge. In particular, children worked on a writing project using diverse cultural artefacts, including oracy, literacy, conceptual maps and ICT. The project involved researching, writing, illustrating and eventually delivering a multimodal conference on a topic of their interest. We first review some central socio-cultural concepts, which serve as a theoretical framework for the research reported. Then we focus on the macro level, describing the context in which the children interacted to create their projects. This context refers to a “learning community” developed as part of an innovative educational programme called “Learning Together”. We then present, at a micro level, in-depth analyses of the quality of the interactions taking place as peers worked together on their projects and how these collaborative processes and uses of the diverse mediational artefacts, and particularly conceptual maps, were gradually appropriated by two teams of 6th grade children (11-12 year-old). Overall, the work reveals the dynamic functioning in educational settings of some central socio-cultural concepts.

INTRODUCTION

The present study is grounded on a socio-cultural perspective, where knowledge is conceptualized as a product of the joint negotiation of participants to make sense of a given situation, using a variety of communicative strategies and mediational means. This perspective also emphasizes the role of diverse cultural artefacts as mediators of human activity, including a variety of tools and signs, which allow the social construction of knowledge. Thus, in this paper we provide an account of how these cultural artefacts, including conceptual maps, mediate interactions as primary school children learn to collaborate on creative writing projects. These activities are embedded in an innovative educational program called “Learning Together”.

ANTECEDENTS

The socio-cultural perspective

The work on collaboration, creativity and the co-construction of oral and written texts reported here is underpinned by a socio-cultural approach to conceptualizing and studying

processes of development, teaching-and-learning and education. Inherent in this approach is the notion that if we are to understand the nature of thinking, learning and development we need to take account of the intrinsically social and communicative nature of human life. In this context, education and cognitive development are seen as cultural processes, whereby knowledge is not only possessed individually but also shared amongst members of communities – with people constructing knowledge and understandings jointly, through their involvement in events which are shaped by cultural and historical factors.

Learning is thus characterized as a process of participation and engagement in shared activities involving the acquisition, and ultimately the transformation, of *both the organizing conceptual theories and the patterns of discourse used by particular reasoning communities*' (Resnick, Pontecorvo & Säljö, 1997: 4). Students thereby progress from 'legitimate peripheral participation' to gradually assuming a more central role as actors and competent participants in their communities of practice over time (Lave & Wenger, 1991). Co-construction of knowledge occurs when people engage in collective activities and practices mediated by a variety of cultural artefacts, including diverse tools and signs, and particularly language (e.g. Cole, 1996; Cole, Engeström & Vasquez, 1997; Mercer, 2000; Rogoff, 1990, 2003; Rogoff, Turkanis & Bartlett, 2001; Wells, 1999; Wertsch, 1988, 1991).

Vygotsky (2003) described language as both a cultural tool (for the sharing of knowledge amongst members of a community) and as a psychological tool (for structuring the processes and content of individual thought). In this context, social interactions are gradually appropriated and re-constructed as internal speech – so called "voices of the mind" (Wertsch, 1991) – which contribute significantly to problem-solving, knowledge construction and self-regulation, among other central psychological functions.

A socio-cultural approach, therefore, presupposes a view of knowledge which is 'open and processual' (Alexander, 2004: 26) and directs us to both look at the potentialities of interactions for learning (at the micro-level), and also to relate the interactional processes observed to the particular institutional and cultural contexts in which such collaborative interactions occur (at the macro-level). The implication is that educational success, and failure, may be explained partly by the quality of educational interactions among teachers and peers, as well as of the cultural artefacts that mediate these interactions (Mercer, 1995, 2000; Rojas-Drummond, 2000).

The educational value of peer group discussion

Recent research has focused considerable attention on the potential value not only of teacher led discussions, but also of peer group interactions and dialogues as another means of promoting learning and development. This is because the latter provides a more symmetrical environment for the co-construction of knowledge in which the inevitable power and status differentials between expert and novice are less likely to apply (Mercer, 2000). However, researchers have differed in their assessments of the educational value of putting children into pairs and groups to work and talk together.

Close consideration of relevant evidence suggests that some ways of talking in group activity are of special educational value, but that such ways are relatively uncommon in

classrooms. This is because children are not usually helped to develop effective dialogic strategies for thinking collectively (Mercer, 1995; Rojas-Drummond, 2000; Rojas-Drummond & Mercer, 2003). The quality of children's discussion when engaged effectively in collaborative activities in the classroom can be related to the idea of Exploratory Talk. According to Mercer (2000: 98), 'Exploratory Talk is that in which partners engage critically but constructively with each other's ideas. Relevant information is offered for joint consideration. Proposals may be challenged and counter-challenged, but if so, reasons are given and alternatives are offered. Agreement is sought as a basis for joint progress. Knowledge is made publicly accountable and reasoning is visible in the talk'. There are good reasons for wanting children to use this kind of talk in group activities, because it represents a distinctive social mode of thinking or 'interthinking' (Mercer, 2000). This constitutes a valuable kind of 'co-reasoning', with speakers following ground rules which help them share knowledge, evaluate evidence and consider options in a reasonable and equitable way.

In this respect, pioneering work by Mercer and Wegerif (e.g. Mercer, Wegerif & Dawes, 1999; Wegerif, Mercer & Dawes, 1999) has enhanced the promotion of Exploratory Talk very successfully in British primary school children. Their results show that this enhancement had a very positive effect on children's group and individual problem solving, as well as in their performance in academic areas such as Mathematics and Social and Natural Sciences (see also Rojas-Drummond & Mercer, 2003). Following these pioneering studies, research in Mexico by Rojas-Drummond and her colleagues (e.g. Rojas-Drummond, Pérez, Vélez, Gómez & Mendoza, 2003; Rojas-Drummond & Peón, 2004) has confirmed that Exploratory Talk is very effective in promoting group and individual reasoning, as well as argumentation skills in primary school children.

The educational value of functional literacy and collaborative writing

We define "functional literacy" broadly to include the competent uses of written language to carry out diverse meaningful social and communicative activities in a variety of cultural contexts (Goodman, Lillis, Maybin & Mercer, 2003, Mercer et al., 2003). Although functional literacy involves reading and writing activities, in this section we will focus on the latter, since collaborative writing is the focus of the present study.

Writing is a socio-cultural process given that its learning takes place in special contexts and institutions designed by society. Even more, this learning involves the competent uses of sophisticated communicative strategies where the interaction between experts and novices is crucial. In addition, writing is not an isolated activity, even if done by one person. The socio-cultural perspective emphasizes that writing is embedded in a complex social world, where pre-existing texts intermingle to create new ones. In other words, when creating a text, there are necessarily references or juxtapositions made by speakers and writers to other texts (Maybin, 2003). This phenomenon is called intertextuality. If intertextuality is evident when the text is created by a sole writer, it is even more prominent when this writing is collaborative, since a new dimension is added: the referencing to each writer's discourse. Collaboration makes the dialogic and intertextual nature of writing even more evident, because "each utterance is part of a larger whole in which all possible meanings of a word interact, possibly conflict, and affect future meaning" (Dale, 1994). Intertextuality is

at the heart of collaborative writing given that participants are constantly blending their voices for a common purpose.

More recently, our conceptions of literacy have been greatly extended to incorporate the variety of uses of ICT that have permeated society as a whole and education in particular. In this context, authors now refer to the integration of the functional uses of this variety of psycholinguistic, technological and cultural artefacts as 'information literacy', 'multimodal literacy' or 'multiliteracies' (see for example Fairclough, 2000; Mercer et al., 2003; Wegerif & Dawes, 2004).

The educational value of conceptual maps as facilitators of the social construction of knowledge

Conceptual maps are used in education alongside learning strategies that can facilitate the individual development of reflection, assimilation and decision making processes (Ontoria & Molina, 1995). Novak and Gowin (1984, in Giombini, 2004), have depicted the act of mapping as a creative activity, in which the learner must exert effort to clarify meanings to a wider audience, by identifying important concepts, relationships, and structure within a specified domain of knowledge.

At the same time, at the social level, the use of this tool may both encourage the sharing of meanings about the theme or subject being learned, and increase the learners' attitudes and values towards collaboration, consensus and compromise. In this context, setting down a concept, proposition, or linking a word on a conceptual map, implies an exploratory dialogue, where each student justifies why and how each of these elements can be present. Also, this dialogical process can facilitate the creation of hierarchies, progressive differentiations and integrative reconciliations of concepts (Ontoria & Molina, 1995; Ontoria et al., 2001).

Conceptual maps can induce participative experiences in the classroom, through the interaction of all the classmates or teams of peers. These experiences can in turn promote the construction and reconstruction of knowledge (Ontoria et al., 2001). When students work in an effective collaborative way, they simultaneously discuss and act on the themes they are learning (Edwards and Mercer, 1987). In this respect, conceptual maps can play the role of mediators for the promotion of an effective collaboration by acting as triggers to discussions which help students construct knowledge jointly. Whether in teams or in the whole group, the construction and reconstruction of conceptual maps, causes students to represent in an explicit way what they know and encourages them to be creative in the way they express their ideas. While working in a collaborative way, conceptual maps can also be used by teachers to help students to focus on the aims of what they are learning. In this way, teachers and conceptual maps guide the inquiry and organization of knowledge and provide feedback to the students about what they are learning as well as about the aims been pursued. They also serve to represent the unfolding of these processes (Novak, 2003).

Given the antecedents reviewed above, in this study we investigated the role of oral and written language, as well as other multimodal mediators such as conceptual maps and ICT, for the social construction of knowledge among peers in primary schools. It is important to

emphasize that research on the role the different cultural artefacts under study play in enhancing learning in students has so far been fragmented. In particular, the socio-cultural perspective has not focused much on the role played by concept mapping as a cultural multimodal mediator of social interactions. On the other hand, research on conceptual maps has so far paid more attention to the cognitive processes involved in their creation, and less attention to the social and institutional factors involved in the use of this tool for the joint construction of knowledge in educational settings. Thus, this study contributes to integrate these hitherto separate areas of research by analyzing the mediation of these artefacts in collaborative activities from a socio-cultural perspective.

THE CONTEXT OF THE STUDY: THE MACRO LEVEL

The collaborative projects children carried out in the research reported are embedded in an innovative educational programme, called 'Learning Together', which has been implemented in a public primary school in Mexico City over the last six years. The purpose of the programme is to form learning communities where all members are encouraged to contribute actively to the social construction of knowledge through the mediation of diverse cultural artefacts. Amongst the mediators that play a central role in our learning community are diverse uses of different genres of oral and written language, multimodal conceptual maps as well as ICT for a variety of teaching and learning purposes. These mediators help to promote the co-construction of knowledge among all participants.

These communities strive to promote key functional social, cognitive, psycholinguistic, technological and academic abilities in primary students. The functioning of the programme is dramatically different from that of ordinary classrooms in most primary state schools in Mexico, which in general do not provide a rich social environment to enhance learning (Mercado, Rojas-Drummond, Weber, Mercer, & Huerta, 1998; Paul Wright, 2005; Rojas-Drummond, 2000). In contrast, our programme seeks to create learning communities where all members participate actively in pursuing authentic and creative collective projects and solving a variety of problems. These involve competent uses of the key abilities promoted, and have meaningful applications in a wide variety of contexts inside as well as outside of school.

The programme '*Learning Together*' is carried out in a multipurpose room within the primary school, designed *ex-professo*. Throughout the academic year, the respective participating teachers and students of each classroom come once a week to this setting for a session coordinated by the respective teacher with the support of several university researchers. Before, during, and after implementation of the programme, teachers and researchers work in close collaboration to design, carry out, review and refine all the activities and materials included in the programme.

The sessions are organized in modules. Each module is designed to develop diverse target general and specific abilities in the students. The initial modules provide the students with general basic abilities necessary to advance in the programme, including collaboration, effective communication and problem solving. The rest of the modules involve promotion of more advanced and specific abilities, which enable students to prepare specific creative

team projects, adapted to their respective grade. These projects involve the dynamic integration of several functional uses of oral and written language, multimodal representations of knowledge in the form of conceptual maps as well as ICT. All the team projects are presented at the end of the school year in a “cultural fair”, with the participation of the whole learning community as well as a much broader audience. This is done to render the projects meaningful and functional, given their genuine communicative purposes to real interlocutors.

Some of the teaching-learning strategies used by teachers and researchers to implement the programme are: the creation of learning environments rich in social interaction where the diverse activities carried out are mediated by a variety of multimodal cultural artefacts (e.g. Cole, 1996); guided participation between experts and novices (e.g. Rogoff, 1990) where adults scaffold children’s learning activities; collaborative learning where peers work jointly in the creation of “Intermental Development Zones” for effective communication and the co-construction of knowledge (Mercer, 2000) and the promotion of socio-constructive styles of interaction and discourse (Rojas-Drummond, 2000).

DESCRIPTION OF THE STUDY: THE MICRO LEVEL

Method

Forty 6th grade children from two classrooms in a state primary school in Mexico City participated in the study (11 to 12 years old). These children were part of a larger sample of students who took part in the programme “Learning Together”. The programme was implemented in 24 weekly sessions lasting 90 minutes each in the setting described above. However, for the present study we report data gathered only in the last module of the programme, where children created their team projects. This module lasted 12 sessions.

As part of the creation of these projects, we promoted abilities related to the comprehension and production of expository texts, including selecting a topic of interest, researching relevant information in different written and digital sources including the Internet, representing the information gathered in multimodal conceptual maps, and summarizing and integrating the information in a coherent text which was later transformed into a conference to be delivered to an audience in the Cultural Fair, accompanied by a Power Point presentation. The conferences produced thus represented a unique opportunity for learning oracy, multimodal literacy and technological skills in a meaningful and functional context.

At the same time, throughout the whole process of creating their projects, children were encouraged to learn to utilize a variety of cultural artefacts to mediate their activities in an integrated fashion. These included: a) *oracy*, by discussing, arguing for their ideas and making decisions as a team; b) *literacy*, by reading and writing a variety of expository texts as part of their research project; c) *ICT*, for looking for information in multimedia digital texts, writing, integrating and revising their successive texts in a word processor and illustrating their conference in Power Point and d) *multimodal conceptual maps* (with text and visual representations), using a software called “Kidspiration”, which helped them to

represent their plans, ideas and knowledge generated throughout the whole process of creating their projects.

Kidspiration favours collaboration and problem-solving, and permits us to see how these processes are constructed. This can be possible because of the friendly manipulation of the software and the spaces that it offers for the student's reflections, which can be written down almost instantly. Students construct their maps in a procedural and continuous way, refining their conceptual maps as their research project progresses over time. Thus, in each session they leave tracks of their collaborative processes, the discussions they engage in, as well as their questions, comments, doubts, arguments, etc. This software is a tool that synthesizes the main and outstanding points of the discussions children engage in and works as a way of assessing the advancement of the students, especially when it is used in a collaborative fashion. Conceptual maps created through Kidspiration let students see their own process of how their knowledge about a subject evolves over time. Therefore, besides being a learning strategy, conceptual maps created through this software work as collaborative diaries or digital portfolios (Novak & Cañas, 2004). Finally, conceptual maps work like a narration system, where creation exists in a multimodal fashion, which ensures a complex communication system (Giombini, 2004).

For each of the two participating classrooms, one triad was randomly selected in order to analyze in an in-depth, detailed fashion their interaction, discourse and successive conceptual maps, as well as the texts and products as they created their conference. From the 12 sessions involved in this module, 4 alternating sessions were video recorded. These 4 sessions were selected since they were representative of the main phases of composing their conferences (planning, writing, integrating and revising and creating multimedia supports). Videos were transcribed verbatim together with a description of the context, following procedures developed by Edwards and Mercer (1987). Videos and transcripts were consecutively analyzed qualitatively on the basis of the content and structure of the dialogical interactions, as well as the micro and macro contexts surrounding these exchanges.

To illustrate how the in-depth micro-analysis mentioned above was carried out, we will present examples of the mediated processes involved in the production of the conference of the two triads under study. In particular, we will focus on the mediation of oracy and conceptual maps by presenting several segments of the various dialogues and the corresponding conceptual maps produced by each triad in the consecutive sessions which were selected to be videotaped. This will be accompanied by an account of how these processes were gradually appropriated by the children and evolved over time as they created their conferences. At the same time, the results of the analysis will be related to the macro level, namely the specific institutional context in which the collaborations occurred.

RESULTS AND DISCUSSION

The data presented below consists mainly of a series of dialogues and the corresponding conceptual maps created by the two triads as they participated in several selected sessions over time. In the series of sessions presented they gradually researched a topic of their

choice in order to create their conferences, which they eventually presented in the “cultural fair”. Triad one researched the topic of “insecurity”, while triad two selected the topic of “tobacco addiction”. The selected sessions are given a number corresponding to that on the module, as well as a title which summarizes the main activities the children were carrying out in the corresponding session. The data for each selected session, presented in the form of a dialogue and the respective conceptual map created, are accompanied by comments and discussions. These data and comments, when considered as a whole, provide evidence of the ways the two triads gradually constructed and represented knowledge jointly about the topic they researched, as well as of the unfolding of these collaborative processes over time.

[NOTE: dialogues have been translated from its original language (Spanish). Notation: TRIAD 1: Ruby (Y), Nancy (N) and Karina (K); TRIAD 2: Rodrigo (R), Ilse (I) and Uriel (U); Facilitator (F)].

TRIAD 1:

Session 1. Selection of theme and research questions

Context: The children have been talking about the possible themes to be researched and start proposing a set of ideas. As they propose these ideas, they search for relevant information in different sources (books, the Internet, etc.) to corroborate them. This enabled them to decide which themes offered more information and to choose one to work on. Following their discussions, they constructed a first version of their conceptual map, on the topic which they eventually chose – “Insecurity”.

Dialogue 1:

(a -Working on the Internet)

K: The drowned kid!

Y: Juarez’s murders!

K: Let me tell you something. Nearby my house, people are starting to steal things. They are assaulting and robbing children. [N laughs]

F: Maybe you can do something related to insecurity or to Juarez’s murders.

Y [Touching N with her shoulder]: So? ...The murders... right?

K: No one knows, no one knew (Mysterious tone).

F: Where can we find information about Juarez’s murders?

Y [Moving her hands, showing connections): You know what we could do? We can put something about Juarez, but also we could link it with something of insecurity, robberies and all that stuff.

F: Which could be your theme- One that could enclose all of them?

K: Insecurity!

(b - Constructing their guiding questions in Word)

F: So, what we want to know first is...

All: "What is Insecurity?" "What do you think about Insecurity?"

F: What else do you want to know about Insecurity? What is interesting for you about Insecurity? Do you know how Insecurity can be fought?

Y: Yeah! That... that question. No?

F: Which question?

N: How can we fight against insecurity?

Y to F: No! How... how... What is the name for that? How did you say it?

K: How can we attack it?

F: Do you have an answer for that?

R: Policeman, though here in Mexico they don't do anything.

F: OK, policemen, but which other means exist to attack it or fight against it?

Version 1 of Conceptual Map on "Insecurity"

(c - Working with Kidspiration)

F: Which one will be your main idea? [K writes *La Inseguridad*]. You know, this map is going to help us to organize all the ideas we have. How are you going to construct it?

Y to N and K: I think that we should write the questions. Which one is the first question? (Then they keep on working...)

Comments: During dialogue 1, the children started to talk about their experiences and how they can relate them to the themes they want to show in their conference. They started to



search for information on the Internet, Y began to talk (verbally and through body language) about insecurity and how it was related to the murders in the City of Juárez. Eventually, insecurity became their central concept, and Juárez an example of it. This prompted several questions to be researched in the next sessions. They wrote their questions using the word processor, which allowed them to create version 1 of their conceptual map. The set of questions presented on the conceptual map was central, given that it guided the research for the subsequent activities which led to the eventual creation of their conference.

TRIAD 2:

Session 4. Creating and organizing answers to the questions put forward for research on “Tobacco Addiction”.

Context: The children have already selected the theme to be researched – tobacco addiction – and proposed a set of questions to be answered. They searched for relevant information in different sources (books, the internet, etc.) to corroborate their opinions. In this session, children continue their research and enrich their conceptual map as a result of their discussion and activities. They also start creating a first version of some slides that will eventually be part of their PP presentation for the cultural fair.

Dialogue 2

F: Which one is the next slide?
Which one is the other theme?
Which ones have you worked on?

I: “What is tobacco addiction?”

F [Pointing to the conceptual map.]:
OK, and now R, from these, which is the next theme to work on?

I and R: “What illnesses are caused because of it?”

U: No! First, we should write, why do they consume it?

F: Why do you think “why do they consume it?” goes first??

U: More or less, how they start to consume it, then the illnesses that are caused because of it, how they can be cured...

R: Yes! Yes! Like a chain!



F: Do you all agree on that? I?

I: Yes.

R: She didn't even listen! Repeat it U [U repeats the decisions that were taken by the 3 of them]

Version 4 of Conceptual Map on "Tobacco Addiction"

Comments: During dialogue 2, the facilitator asked the children to identify the aspect of the theme to be researched next. R and I proposed one answer while U suggested an alternative one. This gave rise to the use of exploratory talk, where the participants supported their perspectives with arguments and negotiated their proposals, eventually reaching consensus (synthesized by U). This exploratory dialogue allowed the participants to reorganize and understand each other's ideas in a more coherent fashion. The overall discussion facilitated the enriching, organizing and refining of their conceptual map. This was done partly by adding, in a third level of the hierarchy of the map, answers to the questions originally proposed in a logical way.

TRIAD 1:

Session 6: Construction of conceptual map on "Insecurity".

Context: The children have been researching their theme in different sources. As they are researching and writing up the data they have found, they build in parallel their conceptual map in Kidspiration. During its construction, they discussed about the possibility of adding it to their PP presentation as an introduction to the conference they will deliver in the Cultural Fair. As a result of this discussion, they planned to make an understandable map so everyone can read and comprehend it.

Dialogue 3.

F: What could you add to your conceptual map? You wrote a new question today, right? Which one is it?

K [Looking at the Word document]: This one... no.

F: Why don't you add it?

All: Where?

R: Which one is the most important? This one...Insecurity. [K adds a new phrase, "Causes of Insecurity", subordinated to the Insecurity concept. They start to describe the causes of Insecurity].

F: Which ones are the causes you wrote in your document?

N: Corruption, that something happens to someone and nobody cares [K speaks simultaneously].

F: Can you synthesize them?

K: Low budget, corruption, and...

N: No denouncing, and...

K: Go on, go on!!

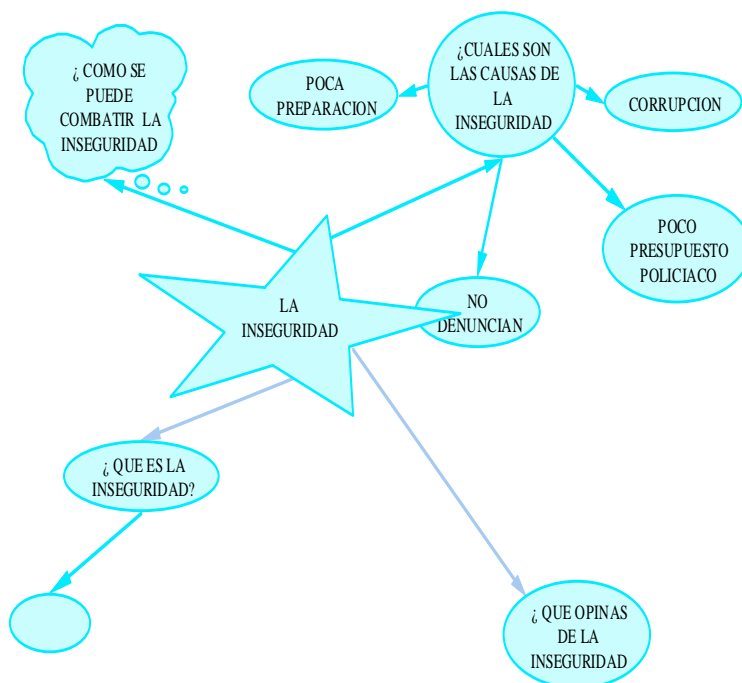
R: They are not well prepared!

F: Exactly! Those four causes have to be in your conceptual map, from here [pointing "Causes of Insecurity in the CM] are going to be four links of the things you have just said.

R: Insecurity like a star and the other ones like clouds [Designing the map to mark the difference between the supra-ordinate and the subordinate concepts].

Version 6 of Conceptual Map on "Insecurity"

Comments: During dialogue 3 the children were discussing how and where to include the information that they have worked on in their document. They formulated a new semantic phrase as a subcategory of the insecurity concept (*¿Cuales son las causas de la inseguridad?* – *which are the causes of insecurity?*), which gave rise to a discussion about causes and effects of Insecurity. Finally, they began to write the most important causes of Insecurity in



the conceptual map. At the end of the session, they decide to give a specific format to the conceptual map, differentiating the main concept from the subordinate ones (semantic phrases), so it could be understandable for them as well as for the audience. In spite of the fact that at times participants speak simultaneously, they do propose ideas, eventually reach agreements and advance importantly on the elaboration on their conceptual map.

TRIAD 2:

Session 11: Creation of PP presentation

Context: The children are creating their PP presentation to accompany the conference they will deliver in the Cultural Fair. As a result of their discussion, they substituted some of the concepts of their original map for images they searched in Kidspiration.

Dialogue 4

R: What image can we put in “What is tobacco addiction”? Is there any plant?

F: Why a plant?

R: Is tobacco.

U: Select the images of plants, that one... that one is tobacco [Searching images in Kidspiration].

R: No, there is no tobacco. And in this one (“Why do they consume it?”). We can put a TV.

U: No.

F: “Why do they consume it?” Why a TV?

R: Because of the influence of it. Isn't that right?

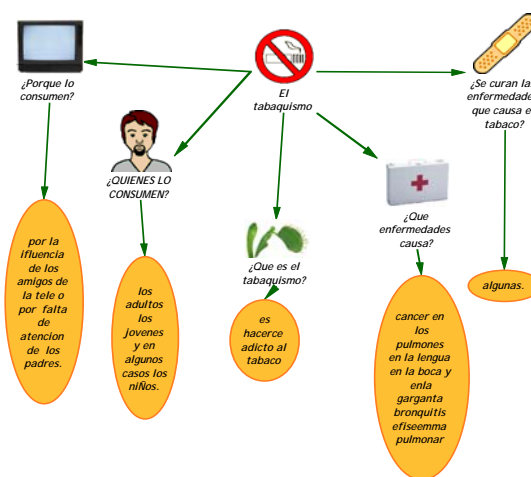
U: “Why do they consume it?” Mmm, put a [R interrupts].

F: What should we put U? [U doesn't answer]

F: Listen, where are you going to put the TV? As an example of the question or as the question. In which level are you going to leave it?

R: Like that [Leaving the image in the question level].

Final Version of Conceptual Map on “Tobacco Addiction”



Comments: During dialogue 4 the children were discussing how to exchange some of the text originally included in the conceptual map into images, which would, in their opinion, convey the meaning in a more eye-catching fashion. These exchanges gave rise to a discussion, which apparently allowed them to eventually reach a more comprehensive understanding of the concepts and their relationships. The discussion also encouraged children to analyze and review the answers they had written previously, leading them to make informed decisions about which image was more appropriate to represent the concept under consideration. The whole process of discussing and reconstructing their map turned their slides into multimodal representations, which facilitated their comprehension of the overall concepts displayed. These transformations also had the potential to convey meaning in a more comprehensive and attractive fashion when children eventually delivered their conference to their audience in the Cultural Fair.

CONCLUSIONS

Overall, the work reported in this paper reveals the functioning in educational settings of some central socio-cultural concepts. The data illustrated processes of collaboration, as shown for example in Dialogue 3 of Triad 1 (Session 6). In this segment participants contribute with different ideas on the causes of insecurity, and they eventually agree to include them all in their conceptual map, placing them hierarchically (a star for the main concept – insecurity – and clouds for subordinate concepts, including causes). It also reflected instances of the use of exploratory talk, as shown for example in Dialogue 2 of Triad 2 (Session 4), where the participants gave their opinions and negotiated different perspectives, providing arguments for their proposals, which allowed them to eventually reach agreements about how to link the questions and answers to be investigated on tobacco addiction in a hierarchical fashion which included cause and effect relations. Similarly, the data showed some dynamic relations among oracy, literacy, conceptual maps and uses of ICT, as shown for instance in Dialogue 4 of Triad 2 (Session 11). In this example, children discussed how to replace concepts for images in their multimodal conceptual map on tobacco addiction in their Power Point presentation. Thus, while they talked they simultaneously created a conceptual map using ICT (Kidspiration and Power Point), which included text as well as images. The data also illustrates how these relations helped children negotiate meanings and comprehend and organize the concepts of the topics under investigation, as shown for instance in Dialogue 1a of Triad 1 (Session 1). In this example, participants contribute originally with a set of ideas, including examples of insecurity such as a drowned child, some murdered people in the City of Juárez and assaults to houses. Eventually they negotiated these perspectives and agreed to integrate them in an organized fashion, selecting insecurity as their central concept, and the Juárez murders as one example of the existence of insecurity. Finally, the various dialogues and conceptual maps produced by the two triads illustrate how the children elaborated jointly multimodal representations of the knowledge they were gradually constructing, transforming and enriching while working collaboratively on creating their team projects. These achievements were possible thanks to their active and continuous participation in the programme *Learning Together* throughout the academic year.

It should be pointed out that, as a first approach to learning how to create conceptual maps, the data reflects a gradual evolution in the organization and comprehension of the themes under investigation. However, most of the concepts included were structured only as semantic phrases, lacking explicitness in the type of links that held between the concepts. This indicates that the conceptual maps children created were not very sophisticated, with respect to the catalogue of elements that complete conceptual maps should contain (see for example Ontoria et. al, 2001). Thus, more time would have been necessary for the children to learn how to construct more elaborate maps.

In conclusion, analyses of the subsequent dialogues and the respective conceptual maps created by the triads reflected an increase in the sophistication of their use of multimodal semiotic representations as well as their ways of communicating orally and in written form. These patterns suggest a gradual appropriation by the children of the various cultural artefacts under study; namely oracy, literacy, conceptual maps and uses of ICT for knowledge construction in the context of the innovative educational programme “Learning Together”.

REFERENCES

- Alexander, R. (2004) *Dialogic Teaching*. Leeds: Dialogos.
- Cole, M. (1996) *Cultural Psychology: A Once and Future Discipline*. Cambridge, M.A.: Harvard University Press.
- Cole, M., Engeström, Y. y Vasquez, O. (Eds.) (1997) *Mind, culture, and activity. Seminal papers from the Laboratory of Comparative Human Cognition*. New York: Cambridge University Press.
- Dale, H. (1994) *Collaborative writing interactions in one ninth-grade classroom*. *Journal of Educational Research*, 87(6).
- Edwards, D. & Mercer, N. (1987) *Common Knowledge: The Development of Understanding in the Classroom*. London: Methuen.
- Fairclough, N. (2000) ‘Discourse, social theory and social research: the discourse of welfare reform’. In *Journal of Sociolinguistics*, 4.
- Giombini, L. (2004) *From Thought to Conceptual Maps: Cmaptools as a writing system*. Proc. of the First Int. Conference on Concept Mapping. Pamplona, Spain.
- Goodman, S., Lillis, T., Maybin, J. & Mercer, N. (2003) *Language, Literacy and Education*. UK: Trentham Books.
- Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

- Maybin J. (2003) 'Voices, intertextuality and induction into schooling'. In Goodman, S., Lillis, T., Maybin, J. & Mercer N. (2003) *Language, Literacy and Education: A reader*, pp159-170. UK: Trentham Books.
- Mercado, R., Rojas-Drummond, S.M., Weber, E., Mercer, N., y Huerta, A. (1998) *La interacción maestro-alumno como vehículo del proceso de enseñanza-aprendizaje en la escuela primaria*. *Morphé*, 8-9, 15-16, Julio 96-Junio 97.
- Mercer, N (1995) *The guided construction of knowledge*. Clevedon: Multilingual Matters Ltd.
- Mercer, N., Wegerif, R., & Dawes, L. (1999) 'Children's talk and the development of reasoning in the classroom'. In *British Educational Research Journal*, 25(1), pp95-112.
- Mercer, N. (2000) *Words and minds. How we use language to think together*. London: Routledge
- Mercer, N., Fernandez, M., Dawes, L., Wegerif, R., & Sams, C. (2003) 'Talk about texts; using ICT to develop children's oral and literate abilities'. In *Reading, Literacy and Language*, 37(2), pp81-89.
- Novak, J. (2003) 'The Promise of New ideas and New Technology for Improving Teaching and Learning'. In *Cell Biology Education*, 2, pp122-132 Summer 2003.
- Novak, J. and Cañas, A. (2004) *Building on New Constructivist Ideas and CmapsTools to Create a New Model for Education*. Institute for Human and Machina Cognition. Available at www.ihmc.us.
- Ontoria, A. and Molina, A. (1995). *Los mapas conceptuales y su aplicación en el aula*. Buenos Aires: Magisterio.
- Ontoria, A. et al. (2001). *Mapas conceptuales. Una técnica para aprender*. Madrid: Narcea.
- Paul Wright, J.E. (2005) *Beliefs and practices of high school biology teachers: a case study of communities of practice*. Unpublished doctoral dissertation. México: DIE/CINVESTAV.
- Resnick, L., Pontecorvo, C. & Säljö, R. (1997) 'Discourse, tools and reasoning'. In Resnick, L., Säljö, R., Pontecorvo, C. & Burge, B. (Eds.) *Discourse, Tools and Reasoning: Essays on Situated Cognition* (pp. 1-20). Berlin and New York: Springer-Verlag.
- Rogoff, B. (1990) *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.
- Rogoff, B. (2003) *The cultural nature of human development*. London: Oxford University Press.
- Rogoff, B., Turkianis, C. & Bartlett, L. (Eds.) (2001) *Learning together: Children and adults in a school community*. London: Oxford University Press.

- Rojas-Drummond, S. (2000) 'Guided participation, discourse and the construction of knowledge in Mexican classrooms'. In Cowie, H. and van der Aalsvoort, G. (eds) *Social Interaction in Learning and Instruction*. Oxford: Pergamon.
- Rojas-Drummond, S.M., Pérez, V., Vélez, M., Gómez, L., y Mendoza, A. (2003) 'Talking for reasoning among Mexican primary school children'. In *Learning and Instruction*, 13(6), pp653-670.
- Rojas-Drummond, S.M., & Mercer, N. (2003) 'Scaffolding the development of effective collaboration and learning'. In *International Journal of Educational Research*, 39, pp99-111.
- Rojas-Drummond, S.M. & Peón, M. (2004) 'Exploratory talk, argumentation and reasoning in Mexican primary school children'. In *Language and Education*, 18, 6, pp539-557.
- Vygotsky, L. (2003) *El desarrollo de los procesos psicológicos superiores*. Barcelona: Critica.
- Wegerif, R., Mercer, N., & Dawes, L. (1999) 'From social interaction to individual reasoning: an empirical investigation of a possible socio-cultural model of cognitive development'. In *Learning and Instruction*, 9(6), pp493-516.
- Wegerif R. & Dawes L. (2004) *Thinking and Learning with ICT. Raising achievement in primary classrooms*. London: RoutledgeFalmer.
- Wells, G. (1999) *Dialogic inquiry: Towards a sociocultural practice and theory of education*. New York: Cambridge University Press.
- Wertsch, J.V. (1988) *Vygotsky y la formación social de la mente*. Barcelona: Paidós
- Wertsch, J.V. (1991) *Voices of the mind. A sociocultural approach to mediated action*. Cambridge, Massachusetts: Harvard University Press.
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