TEO –
The role and function of an oral text editor in language learning in a multilingual context

Gerard Gretsch

Goldsmiths
University of London

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I hereby declare that, except where explicit attribution is made, the work presented in this thesis is entirely my own.

Signed__________________________

Gerard Gretsch
September 2010
Abstract

In my thesis I describe and research the use of an oral text editor (TEO) in the language production process of a group of three children (two girls and one boy of 8 years). The children learn French as a target language in the context of a regular second grade multilingual Luxembourgish classroom. With TEO these children produce stories in French while relying on the Luxembourgish language for negotiating the contents of the story as well as the language forms needed. Through storying the children assign significance to objects and events by integrating their personal histories. The target language, its vocabulary and its grammar emerge from the communicative language produced in the process of storying with the TEO tool.

I study the impact of TEO as a nonhuman actor on the language learning process in the constantly changing collective or association of human and nonhuman actors constituting the TEO team. Concepts of Activity Theory and Actor-Network-Theory are used to explain and extend the tool metaphor underlying the use of electronic tools in language learning in a multilingual classroom.

The transcription and detailed analysis of about ten minutes of language production provides the main data of my thesis. The transcription follows the interplay of TEO as a nonhuman actor and of the bodies of the human actors instantiated in their particular utterances, gestures, gazes and voices. The collective language production process emerging from the transcription is described and interpreted by referring to the transcribed text which includes a substantial number of stills taken from the videotape, thus revealing the roles and functions of TEO in the collective oral French language learning process.
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A CD with the video sequence that is transcribed for analysis in my thesis is placed in a pocket attached to the back cover.
1 Introduction

Since the early 1980s the use of computers and related technologies has become of interest in schools for enhancing learning in many curricular areas by providing an extra source of motivation for children. Information technology tools have promised a lot, but evaluative efforts have to be constantly made in order to study the influence and the outcome of these particular societal tools within institutionalised schooling.

In this thesis I explore the use of a software tool that allows speech to be recorded, represented on a screen and edited. TEO (Text Editor Oral) is used by a group of three children (two girls and one boy) in the context of a second grade Luxembourgish classroom with 8-year old pupils. These children had been used to producing stories or narratives in the French target language with TEO while relying on the Luxembourgish language to discuss and negotiate the contents of the story as well as the language forms needed at any particular moment of the plot. It is this process of storying that provided the children with reasons for producing the target language by allowing them to assign relevance and significance to objects and events. Their personal histories, trajectories and identities become part of the language production process. The target language and its grammar are constructed from the communicative language produced in the process of storying with TEO.

In particular, I explore the impact of TEO on the language learning process in terms of a constantly changing interaction within a collective of human and nonhuman actors (Latour, 1999). My thesis can thus be read as an attempt to study an artefact or tool as an integral and inseparable component of human functioning (Engeström, 1999), in this case the learning of a second or foreign language. The focus in my work is clearly on the particular TEO tool, its history and influence on human functioning (McDonald et al., 2005) in the collective and associative endeavour of language production and learning. Thus, a
‘thingy’ history (Latour, 1999) of the collective language learning in the TEO team can be outlined which assembles the human and nonhuman actors. ‘Things’ such as TEO then join the pupils in the narrative of the learning episode and temporarily share existence with them. For Latour the respect of the ‘thingy’ history of the TEO team’s efforts renders the collective even more human as things incorporate human characteristics.

I show that working with TEO goes beyond the ‘simple’ tool metaphor so often referred to when it comes to describing the implementation and the role of technological devices in learning and educational processes. While the open process or flux of language production and learning is at the core of the situation, I focus my attention on the importance of the work with the computer and the TEO software by analysing the articulations between the human and nonhuman actors (Latour, 1999).

In Chapter Two I provide a rationale for the development of the TEO software. I narrate - in a process similar to storying - how, in the course of my personal development and my professional career as a teacher and teacher trainer my interest in language learning came to shift from a focus on psycholinguistic factors to the situated practice in Luxembourg’s multilingual primary and preschool classrooms.

A short description of the TEO software, its origin, its main features and functionalities are given in Chapter Three, including a rationale for its use in Luxembourg’s multilingual classrooms. The TEO project represents a shift from product to process in the views I present on language learning. It highlights a shift from individual to collective language production and language learning, leading up to the recognition of the importance of children’s first language in the process of learning a second or third language. Hence, I introduce the important notion of the TEO team which associates the human and nonhuman actors in the language learning process.

I continue in the fourth chapter with a summary of the concept of storying which provides the glue, the threading or framework for the system’s working mechanisms in the
language production and language learning process. Many facets that contribute to the power of the concept of storying in the language production process are presented. Ultimately, storying is the means by which the nonhuman actor TEO is integrated into the language learning process (Latour, 1999).

My thesis continues with a fifth chapter on concepts drawn from Activity Theory that may account for the processes underlying the use of information technology in school settings. This chapter is extended with views from Actor-Network-Theory. In particular, I outline how concepts and procedures drawn from Actor-Network-Theory help to overcome the dichotomy between the subject and the object of an activity that still prevails in Activity Theory. In fact, the subordination of nonhuman objects to the intentions of human subjects prevents the recognition of their significance and the understanding of their role as actors in the language learning team.

In Chapter Six I present the methodology of description and transcription with a focus on ‘TranScripter’, a methodological device I have chosen for representing and analysing the discourse involving the human and nonhuman actors. This tool allows one to follow the actors and specifically TEO through its powerful graphic display. The research setting where the empirical data have been collected is described. I explain why the data have been collected in this particular classroom. The role of the teacher in the language production process is clarified. The data consist of a transcription of a video sequence showing an instance of language production in a multilingual setting. These data highlight how human and nonhuman actors’ contributions to the language production process with TEO make it a situated, distributed process and thus a network system open for interpretation. Methodological considerations concerning the transcription and interpretation of the video sequence chosen to illustrate the distributed language production process are then outlined.
Chapter Seven analyses the roles and functions of TEO in the team’s language production and learning process. The overlapping of utterances and my use of the term ‘gesture’ are explained. The transcription follows the interplay of the bodies of human actors as instantiated in their particular gestures, gazes and voices, and of the nonhuman actor TEO. The emergence of the nonhuman actor TEO in the discursive space helps me to unveil the roles and functions of TEO in the oral French language learning process. The collective language production process is described, analysed and interpreted by referring to the continuous text of the transcription and to a substantial number of stills taken from the videotape. The process of description and interpretation as informed by concepts of Actor-Network-Theory, ecological linguistics and the notion of ‘affordance’ allows for the tracing and the identification of the roles and functions of nonhuman actors. Hence, the opportunities of language production and of sustained language learning in the distributed network and association of human and nonhuman actors involving TEO are explored.

A summary and a critical review of the general findings are provided and a conclusion and a bibliography complete the thesis.
2 The itinerary of a personal investigation of language, language learning, meaning making and communication: a rationale for the development of the TEO tool

‘Any form of work that never entails error is beyond the human condition. (…) I wanted to describe another human condition: not someone stuck in a repetitive job, as so many are in today’s world, but someone (…) who takes the risk of getting it wrong, who will try and try again an infinity of times (…).’

Primo Levi (2001, pp. 123, 127)

Among my first memories are those of a baby immersed in some strange rituals of a certain culture at the intersection of different borders on the Moselle river in the late fifties. Held by some strong arms I could see the regular up and down of the tariff barrier separating the Saarland, then under French control, from the German Rhineland-Palatinate across the river. I still vividly remember the deeply saturated blue colour of the French customs officers’ uniforms and the thick red stripe that lined their trousers. Sometimes I was able to get a closer view of a black French customs officer when we crossed the border between Luxembourg and France on our regular trips to Thionville in France where some relatives of my mother lived. The grandmother and the grandfather in this family spoke to me and to my younger sister in a fairly understandable Luxembourgish regional dialect whereas we could not grasp their daughter’s French. Living on the Moselle river and moving up and down its shore has always been part of my family history; my grandfather was one of the last professional fishermen in Luxembourg. Each of my uncles and aunts had been born in a different spot along the Moselle, some on the French side, some in Germany, others in Luxembourg. Anyway, the Moselle will keep flowing and it creates in my mind a metaphor of change and transformation that is best revealed when the river quits its bed and extends its borders during its regular floods. These are the
foundations of my lifelong fascination with the interpenetrations and mixtures of cultures and languages and of the ensuing questionings:

- Why am I standing/living on this side and not on the other side (of the Moselle river),
- why am I here and not there?

They popped up in my mind while I was watching the big steam locomotives with their heavy coal loads stomping up the other side of the Moselle on their way into France. Tiny details such as the red colour of the fireman’s scarf fluttering in the wind as he was leaning out of the cabin keep creeping up in my mind. For years the rhythm of my nights was ruled by the schedule of these freight trains as I was awakened by the hard pounding of the locomotives during the night just to fall asleep again with a growing confidence into their eternal re-emergence. Sadly enough, eternity finished in the late seventies when these coal engines were finally replaced with Diesel locomotives.

Later on, as a pupil in primary school, learning to read and write provided me with a medium for expanding my imagination, but also for learning about the world and about the people in it. I simply adored leafing through encyclopaedia, through books on geography and history and through documentary writings at bedtime. My taste for fiction was enhanced by long storytelling sessions with my older brother in bed before finally falling into sleep. Even my nickname ‘Mick’ stems from such preoccupations as I spent hours after and in-between school reading the famous comics in the stationer’s shop a great-aunt of mine had established in our small town. On regular occasions such as birthdays or especially cherished ones such as having to stay ill at home (although I enjoyed school) I was offered new reading material by my great-aunt. The hardship suffered during deportation and resistance in World War 2 had made her a notorious Francophile who deliberately mixed the German comics I preferred with French and Belgian ones.

A passion for literature was born with comics paving the way for complete books in the German language; those of the German adventure writer Karl May being read and re-read
at a spectacular speed. Consequently, reading lessons in primary school turned out to be very boring for me. I refused to accomplish the basic reading assignments at home to the great distress of my mother. However, my passion for reading did not carry over to the French language as the sociocultural context at the German border never demanded explicit preoccupation with this language. My mother for instance had been living on the German side of the Moselle river in her youth and had not attended French classes. She thus spoke French only in a rudimentary way. My father, although born in a French village on the Moselle, had accompanied his fishermen’s family along the river in pursuit of the fishing grounds. Hence, my French family background has vanished in the German-Luxembourgish dialect spoken by this part of my family. Nevertheless, at the end of primary school, the teacher prompted my parents to make sure that I attend Latin classes in secondary school as he had detected in me some abilities for the learning of languages. At the admission sessions I must have done some brilliant work in the German tests consisting of a dictation and a written reproduction as it had certainly to compensate for my lack of understanding of the French language in the same tasks. I still remember painfully that I did neither understand the title nor much of the text of the reproduction we had to complete in the French language.

In spite of having trouble with French at the beginning of secondary school my natural inclination towards reading and writing intensified as I quickly overcame the problems by radically following the only advice given by my French teacher: ‘Read as many books in French as possible.’ I devoured the French comics offered by my aunt years before and swiftly shifted to adventure stories in pocket books. Consequently, I became an avid reader and writer in German, French and English in the company of similar minded comrades. We were eagerly attending lectures by German and French poets in cultural agencies of all possible sorts, sometimes being mesmerised by their stubborn reactions to the introductions to their work offered by some teacher of ours. The resistance of the
German writer Uwe Johnson to the analysis of his work by a detested professor of German remains as vivid today as it was more than thirty-five years ago. I was proud to be selected year after year by our secondary school as an outstanding student in the German and French languages.

Despite the advice of some teachers I did not enter the section for languages at secondary school and consequently chose to study economics at the university of Saarbrücken in Germany; a choice dictated by my inclination towards the German language as well as by my desire to make languages meet with mathematics. However, I soon realised that I did not want to be stuck with the sterile facts of economical language, theories and textbooks. A short period of reflection generated but one possibility for a job encompassing my personal interests, my sense for initiative and my desire for concrete work with real people: teaching in primary classrooms. I immediately enrolled for about six months with the Luxembourgish inspectorate’s primary teacher replacement service. Following a brief internship I was able to replace sick teachers for shorter or longer periods, one of them lasting about four months in a first grade classroom. I came to enjoy the possibilities of active and transformative work in primary school and decided to join the teacher-training institute for a period of two years.

Little was I told there that would add to my own readings and most of the time was spent preparing detailed lesson plans that left no space for errors, risk or personal initiative either on my side or that of the pupils. At the teacher-training institute there was a heavy bias towards a curriculum vaguely inspired by ideas on child development in the work of the Swiss biologist, logical epistemologist and psychologist Jean Piaget (Ducret, 1990). From the beginning I was not really convinced of the relevance of Piaget’s ideas as applied to the turmoil of normal classroom work. I came to believe that even Piaget himself would not agree with some teacher-trainers’ interpretations of his theories. Later on I discovered that Piaget (1977) did not endorse simple transpositions of his theories into the
curricular field, an attitude shared by William James (1900) who considered scientific psychology as not conducive to definite programmes and methods of instruction for immediate schoolroom use.

I also strongly doubted the behaviourist rationale prevalent in the teacher-training institute where our teachers often professed that behaviourism could cure any disability (Edgar, 1998). Our teacher trainers made us feel guilty as they linked pupils’ failures directly to our strategies and attitudes as teachers. Such a highly moralised stance seemed to me at a great distance from the educational context and doomed to fail due to the extreme limitation of its approach.

As I felt relatively at ease with reading the set literature and with writing the obligatory reports, the studies did not prove to be very difficult or demanding: I was promoted with a major distinction despite a heavy clash with one of the top ranked trainers from the psychology department. Light-heartedly I left the training institute in 1977 still armed with a certain utopian vision of finally being able to implement my personal views and beliefs with a focus on language education in a classroom of my own.

Little did I know and imagine at that time what it meant to be in charge of thirty-three kids in a combined first and second grade classroom in the eastern part of Luxembourg next to the German border. This situation came as a shock as I had been trained in the well equipped classrooms of the city of Luxembourg with a maximum of eighteen children in a single grade. My ‘classroom’ was used as a ballroom at weekends. It featured an unusually small blackboard with a size of barely two square meters. The frequent balls did nothing to cheer me up, despite the occasional beer remaining on the counter after local festivities.

The time to struggle had finally come for me and repeating earlier strategies simply did not do. Within two or three months I found myself absorbed by the task of managing the classroom and by its differential multicultural and multilingual needs. I desperately tried to
implement some of the ideas gathered during practical training in the previous two years, but to no avail. The reality proved much too complex for simplistic recipes to work with the children in my classroom without putting them into a straitjacket; at least that was how I felt. How was I to sustain the interest and the motivation of thirty-three children in the learning processes that would give them some of the satisfactions that I had experienced in my own learning? I was not deterred though from searching for strategies and for tools that would enable me to keep even the least motivated pupil involved as long as possible, a personal attitude of mine that probably led to my developing a tool like TEO.

Over the next few years I tried to establish a lively context for learning or a ‘productive learning environment’ (Sarason, 1972, 2001, 2002), that is, a classroom with sparks indicative of curiosity, propelling interests, eagerness, or signs of an active inner life (Sarason, 2002). A productive learning environment is based on the autonomy and responsibility of the learners who must constantly establish this environment by working with specific methods and tools albeit within the framework of the official curriculum. The pupils define a working environment largely based on their own choices, interests and decisions within a community of learners where everybody deserves the same respect. These are values embodied in the pedagogical works of Célestin Freinet (1969, 1994), Anton Makarenko (1967), Tolstoy (1967, 1980) and the Scuola di Barbiana (1970), which I was devouring in search of solutions for the problems in my classroom. I needed to move away from a curriculum design where ‘the active role of the learner, in terms of choices and strategies, is neglected, and quantity (…) threatens to take precedence over quality’ (Van Lier, 1996, p. 50). The pupils were to make sense of the subject matter that we had to cover on the basis of the curriculum at hand. I would therefore have to start from the individual and collective needs of the pupils living with me in the classroom: ‘The amount heard or read is of no importance. The more the better provided the student has a need for it and can apply it in some situation of his own’ (Dewey, 1966, p. 186).
The initiative of establishing a printing workshop in my classroom implied a differentiated, child-centred organisation of the learning environment through the implementation of specific working methods and specific tools, of which the printing press was the most prominent one. Children were to become authors of their own texts and we published a lot of documents, booklets and papers over the next few years. Reading and writing activities became increasingly fused and reflected upon in the single activity of setting up one’s own text. Of course the changes in the pedagogical approach, the new methods and the new tools had to be presented and explained to the pupils’ parents. Together we transformed the classroom into a working space that fostered authenticity by working towards cooperation and by training the students to become autonomous on the basis of their personal experiences (Van Lier, 1996). This new approach aroused the interest of other teachers at the same school and they started experimenting with it. Eventually a class correspondence was established with other schools in Luxembourg and there was a short-lived exchange with a Portuguese school in Lisbon. After quite a tumultuous start it seemed that after five years I had finally reached some kind of equilibrium and stability in my pedagogical endeavours. But change was in the air and soon enough it reached our school in the shape of a new tool or, better, a new technology.

My pedagogical developments outlined above were invigorated by the arrival of two BBC computers in my classroom in 1985. Originally they were intended for carrying out a mathematical project in LOGO programming under the strict supervision of the Ministry of Education. LOGO is a computer programming language used for functional programming that was specifically created in 1967 for educational use and for constructivist teaching. LOGO features a turtle, which is an on-screen cursor, which can be given movement and drawing instructions, and used to programmatically produce line graphics. According to the Ministry’s specifications, the use of the computers in my classroom should have been limited to the LOGO program. Children would work in pairs and I was basically in charge of
documenting the course of action and the outcome of the children’s working hours. The children’s enthusiasm for putting their own hypotheses to the test, for using numbers and for completing complex figures with the LOGO turtle became immediately apparent. They discovered the usefulness of computing numbers through their own projects and designs and even ventured into establishing named sets of instructions or ‘procedures’ to make their computational work easier. Simultaneously I was struck by the wealth of communication and discussion generated by the work on the LOGO projects.

Within two months the children appropriated the tool and insisted on using it for word-processing, a move which I had initially resisted in obedience to the Ministry’s instructions. One child insisted that ‘the whole alphabet and even much more is right there’ while holding the keyboard in front of my incredulous eyes. At that time I had just been reading Graves’ (1983) book on writing workshops as well as Cohen’s (1987, 1992) books on the use of computers in developing oral and written language skills. A combination with some of Freinet’s ideas already in operation in my classroom generated the practice of free writing within the conceptual framework of a writer’s workshop as the basis for the development of oral and written language skills. The pupils worked on their own in a small room located between two regular classrooms. Even today I remain indebted to the then mayor of the local community of Canach who, obviously concerned about a return on investment, insisted on transforming the school building so that the two computers could be shared between different classroom communities. This particular setting favoured interaction and exchange and led to specific insights into the processes of oral and written language development. My professional development would not have been the same without the determination of this man in the face of some teachers’ stubborn initial resistance. Today I can link this experience to transactional ideas expressed in Rosenblatt’s (1988, p. 15) words: ‘(...) human activity is always in transaction, in a reciprocal relationship, with an environment, a context, a total situation. Teachers and
pupils in the classroom are transacting with one another and the school environment; their context broadens to include the whole institutional, social, and cultural environment.

Another important step in my professional development was brought about by a videotape of a sequence of two girls working on a text of their own with the computer. The videotape was rather casually made by my then father-in-law in order to be presented at a seminar organised by the Ministry of Education. This video sequence radically challenged my perception of the individual qualities of the pupils and of their importance in the language production process as I simply had not expected the high level of involvement in their work of these particular children. It also altered my view on the framework necessary for effective written and oral language learning. The viewing and re-viewing of this short video sequence challenged my belief that teaching-as-usual would result in individual assessable productions (Davies, 2000). It forced me to acknowledge the importance of autonomous and responsible collaborative or collective work in learning situations. By looking again and again at the negotiation processes that accompanied the work on language in this videotape, I witnessed an instance of learning which respected ‘the central role of semiotic mediation in learning-and-teaching, using videotaped observations of interaction in classrooms in conjunction with (...) reading of (...) literature in order to understand the key features of our practice and to use this understanding to make changes that we believe will bring our practice into greater conformity with our vision’ (Wells, 2002, p. 205). Children’s perceptions and formulations of valued goals from then on guided the organisation of learning processes in my classroom. I now operated with sensitive neglect, trying to avoid teaching interventions as long as I could and endeavouring to adopt a responsive resource-service role rather than a directional role (Schostak, 1988).

All subsequent sessions videotaped in order to document work in the writers’ workshop as well as with TEO strengthened my conviction that we must view the
educational context, with the classroom at its centre, as ‘a complex system in which events do not occur in linear and causal fashion, but in which a multitude of forces interact in complex, self-organizing ways, and create changes and patterns that are part predictable, part unpredictable’ (Van Lier, 1996, p. 148). The German sociologist Norbert Elias (1983) expressed the same idea in a German television interview when he stated that, as human beings, we should be well aware that all of our well planned actions will have to occur in a big frame of the ‘unplanned’.

In 1988 I was offered the opportunity to attend courses at the Institute of Education in London in the context of an Associateship programme. I discovered that the courses related to information technologies certainly offered insights into the context of computing in our society but nevertheless failed to address the practical work in classrooms where I had much more experience than was available at that time in most UK classrooms. With my interest in language learning processes unaltered, I was finally able to join a course on the development and acquisition of literacy taught by Margaret Meek (1991). Among many interesting concepts about language learning (Donaldson, 1980, Barnes, 1976, Britton, 1970, Bruner, 1986, Rosen and Rosen, 1973) I was confronted for the first time with the theory of the Russian psychologist L. S. Vygotsky. I had finally come upon a psychologist who valued teaching and instruction, hence valuing my professional choice by putting me in charge of organising the ‘zone of proximal or potential development’ wherein pupils’ learning processes come to be propelled (Vygotsky, 1978). I was offered serious theoretical underpinnings for some of the learning experiences I had been tentatively establishing in my primary classroom while trying to maintain my belief in the human potential and the educability of my pupils (Simon, 1998). Learning and teaching came to be located in an interpersonal space within a socio-historical and sociocultural context that had to be accounted for. I adopted the view that social relations genetically underlie all higher functions and their relationships (Vygotsky, 1986).
On my return to a first and second grade primary classroom in 1989 I tried to organise my teaching as well as the children’s learning processes according to the Vygotskian agenda. This meant providing much more time for group-work and for ongoing reflections on intermediary steps, i.e. valuing the process over the product or outcome of the learning activity. Hence, the documentation of ongoing learning activities had to be organised. I intensified my collaboration with parents and the use of other local sociocultural resources for covering the curriculum, for enhancing the children’s learning processes and for making my change of paradigm understandable and explicit.

After working half-time while being in charge of teaching in-service training courses related to the use of computers in primary classrooms, I finally joined the Ministry of Education for a full-time job in 1992. I wrote a substantial report on my experience with computers in a writer’s workshop published as ‘Computer im Schreibatelier’ (Gretsch, 1992), and also produced a videotape of the work in my classroom. Along with the report it was widely circulated among the professional teaching community in Luxembourg. I delivered courses on language teaching at the teacher-training institute, where I would eventually transfer to from the Ministry of Education in 1998. While in London in 1988 and through Meek’s course I had first been acquainted with the ideas of the Russian scholar in literature and semiotics, Mikhail Bakhtin (1981). Many of his ideas and concepts (utterance, dialogue, authorship, voice, response) as well as the videotaped evidence that pupils talked a lot among themselves during the writing process corroborated my conviction that an oral word-processor could and should be created that enabled children to speak their own stories into a computer.

The TEO (Text Editor Oral) project was launched then and there. It was based on an idea of a secondary teacher who recorded sentences by his students for assessing their grammatical correctness. The director of the Centre for Technology in Education brought forward this idea in a meeting and it was decided that the Ministry of Education would back
a project leading up to the design of TEO on the theoretical basis outlined above. An extensive report on the initial TEO project was published in 1994 with a practical part containing reports by teachers who had decided to implement TEO into their regular classroom curriculum and a theoretical part by myself relying on Vygotskian and Bakhtinian ideas with a focus on the development of children’s strategies for the acquisition of competencies in oral language production (Gretsch, 1994). Videotapes illustrating work with TEO in all primary and preschool grades were also released. Ultimately a CD-ROM ‘TEO Tool Box’ with the software, basic texts and videos illustrating the theoretical key concepts in the oral language learning process with perspectives by pupils, teachers and theoreticians was also distributed among the professional community. Concepts like ‘activity’, ‘dialogue’, ‘voice’, ‘imitation’, ‘comprehension’, ‘meta-language’ among others were identified in the videos and visualised in the CD-ROM. 2010 will eventually see the launch of a web-portal called TEO2. This website will feature all the documents related to the development of TEO and to the practical work with TEO during the last fifteen years. It will promote current projects which follow the philosophy of storying at the centre of the TEO approach, in particular projects around picture books and children’s literature as well as aesthetical biographies where teacher students are constructing their professional identities by aesthetically transforming events and objects of their lives (Bourg and Gretsch, 2008).

I have continued to use the material from the initial TEO project in my teacher training courses and in in-service teacher-training. These materials are predominant in the theoretical foundations for work in projects like ‘Development of Language Competences in Preschool’ or DECOLAP (1995-1996) and ‘Development of Language Competences in Primary School’ or DECOPRIM (1997-1999) which target teachers who investigate and innovate in language learning processes in a multilingual and multicultural setting. They
also influenced the agenda of the Task Force for the implementation of information and communication technologies that I headed at the Ministry of Education in 1996.

DECOLAP and DECOPRIM implemented information technology in order to foster a community of practice (Lave, 1996, Lave and Wenger, 1991) among the teachers willing to publish their own as well as their pupils’ work in the context of an ongoing reflection on the different learning processes. Teachers and teacher trainers worked towards a theory of practice in order to understand the shaping and the reproduction of educational institutions and systems (Bourdieu, 1990). Ultimately DECOLAP and DECOPRIM led to a new project called ‘Development of Expertise in a Collaborative Open Technologically Enriched Educational Context’ or DECOTEC (Gretsch et al., 2001, 2004, 2005). DECOTEC as a collaborative electronic platform and as a mediating tool fostered dialogue and communication around learning processes amongst all actors during teacher training in the second year at the teacher-training institute and subsequently at the University of Luxembourg where I was appointed in 2003. The project used concepts from Activity Theory to research the collaborative knowledge building process (Engeström, 1987, 1996, 1999, Cole, 1995, 1996) in teacher training.

In retrospect, there have been important shifts in my approach to language learning processes with TEO occasioned by my studies of theoretical approaches such as socio-constructivist theories, Activity Theory and lately Actor-Network-Theory that try to capture human thinking and learning in everyday activities. My immersion in a school culture of testing and evaluating individual performance on specific tasks for a long time prevented my appreciating the collective nature of the oral and written productions of a group of children with electronic tools. Schools – at any level - ultimately come to locate knowledge and competence in the head of the individual pupil or student, even when it comes to the learning and acquisition of a collective cultural tool such as language, which typically comes into existence in associative and communicative situations (Sapir, 1985). Like
many professional teachers, I still find it extremely difficult to free my mind from this hard-nosed individualism, when it comes to characterising learning, even if I know from Vygotsky’s texts that social interaction precedes individual achievement and that human beings use collective and societal tools like language or computers to achieve their individual ends.

In my thesis I want to adopt a larger unit of analysis for the children’s language learning process. Whereas I was previously primarily focused on the *individual* psycholinguistic process of language learning and on the different means or media for fostering cooperation and interaction in the target language, I later came to consider the whole activity setting or transactional context involving a *group* of children together *with* the mediational means or intermediary objects as the unit of analysis (Mondada, 2002, Vinck, 1999, Latour, 1999, 2005).

I now take as a starting point that persons and objects unite in cultural contexts in order to form socially assembled situations for action where language learning can occur. One could also talk of lived situations (Greene, 1998) in order to highlight the ever-changing nature of the performances related to language production as it occurs in the field (Van Lier, 2004). From an emphasis on individual cognitive activity in language learning situations I have switched to a view of such situations as instances of situated and distributed cognitive activities (Hutchins, 1996, Hollan et al., 1999) among different entities. Generally, language learning is situated when it takes place in the situations and in the context in which it is applied. Hence, language learning is no longer seen as an instance of transmission of abstract knowledge about language forms from one individual to another, but as a social process whereby language is co-constructed. Language learning as a cognitive activity can then be considered as distributed among all the participants within a particular context or situation.
Lately I have come to appreciate Latour’s notion of the construction of society through objects and nonhuman elements (Latour, 1989), a notion that reminds me of the need to respect the fact that the child and the sociocultural environment are both active agents in developmental processes (Cole, 1996). For instance, the separated room as an open space for collaborating and for generating ideas between my pupils mentioned before comes to my mind as an instantiation of the importance of a thing as society. It is in this space where the official world of the school with its tasks and objectives meets the unofficial world of the children’s interests and sociocultural resources (Dyson, 1993, 2003) in the process of storying with the TEO tool. The simple description – as exhaustive as possible – of this hybrid space and hybrid practice should enable me to reveal usually unrecognised phenomena that play important roles in the language production process of the TEO team. The practice of storying with TEO can have the potential to ‘blur the boundaries of formal schooling and socially meaningful communicative activity and thus create hybrid spaces that couple historical processes of language acculturation with the contingencies of emergent communicative practice’ (Lantolf and Thorne, 2006, p. 68).

The role and function of objects in the construction and maintenance of lived situations has gained my enduring interest. I have been collaborating from 2006 on with a colleague from the Arts Department at the University of Luxembourg in order to get students to complete an aesthetical biography of themselves or of a fictional self, a work that for most of them entails a significant and profound investigation of the roles and functions of familiar objects that surround them from their childhood on (Bourg and Gretsch, 2008). In recent works Turkle (2008, 2007, 2008a, 2009) speaks of objects leaving traces that will mark the rest of our life and which are experienced as co-extensive with the self. Turkle (2008a) provides a link for thinking about the role and function of TEO in pupils’ language learning when she says that objects can make children feel safe, valuable, and part of something larger than themselves. As a strong indicator for the importance that objects,
things and nature have in our society Latour (1999) mentions the fact that in the face of a growing ecological crisis human associations of citizens and politicians are ready to grant to nonhumans some sort of rights and even legal standing.

In my more than twenty-five years of experience with ICT in education at different levels (as a teacher, as head of the Ministry of Education’s task force on ICT, as a teacher trainer) the role and function of electronic devices in children’s learning processes has often been characterised by my interlocutors with the following words: ‘The computer is simply/merely/just a tool.’ This utterance signals to me their add-on character as a supplementary source of motivation for the children. All the more often these tools are seen as interfering with ‘real’ human activities and objectives and as threatening our identities as teachers (Turkle, 2009). Loss of human control is feared in the face of machine invasion as the use of machine metaphors marks persistent fears of invasion, possession and authoritarian control (Sanal, 2008). The tool metaphor as used by my interlocutors fails to consider the important role of computers or electronic devices as participants in the production process. The importance of TEO and of computer technology in general has been highlighted by a simple but persistent question that came to my mind while observing and documenting the frenzy of inspiration during the pupils’ storying activity with and around the TEO tool: ‘Why do these children talk to or into a machine when they can easily chat their time away with the other members of their group?’ That was the moment when I realised that the responsibility for action must be shared among the various actants (Latour, 1999). Latour uses the term ‘actant’, which encompasses humans and nonhumans, in order to avoid using the term ‘actor’ (Latour, 1989), which would tilt the enactment of responsibility over to the humans for the sake of its anthropomorphic quality. Actants exist in the unique and un-repeatable relations of an event (Harman, 2009).
Electronic devices and other nonhuman elements have become important factors for me in the analysis of the joint language production process with TEO. The TEO tool exists and unfolds its potential in a larger context which structures its function in the communication system that I call the TEO team (Birdwhistell, 1970). In the data analyses resulting from my empirical work, I uncover TEO’s properties and potentialities, its role and function in maintaining the language production and hence the learning process. My concern for maintaining the language learning process with all of the children of my classroom fully engaged thus transforms into my big research question about the role and function of TEO as a tool and a participant in the team production process. The combined empirical data under investigation, i.e. the transcription of a video sequence with the help of TranScripter and the analysis of visual and gestural data with the help of video stills allow for closer examination of the role, function and characteristics of the actor, object and tool called TEO in the team language production process.

My main research question dealing with the role and function of TEO in the process of language learning in a multilingual classroom is consistent with my continued personal viewpoint about the importance of each child’s inclusion into the common learning objective, process and experience. Before exploring the role and the function of TEO in this particular educational ensemble, I will depart from my personal narrative in the domain of education and learning. The next chapter provides a short description of the TEO software along with a more detailed description of the cultural and institutional settings.
3 Introducing and describing the tool: the TEO (Text Editor Oral) software

The idea for the development of TEO (Text Editor Oral) grew out of a project set up as a writer’s workshop in a combined first and second grade Luxembourgish classroom. This workshop used a classical printing press along methods devised by the French teacher Célestin Freinet (Freinet, 1969, 1994, Gretsch, 1992, Fiermonte, 1994, 1996) from 1982 on. As early as 1986, the computer was taking over from lead type and electronic printing eventually replaced the manual printing process.

The children were writing their own texts in German in order to be published in a classroom newspaper that was distributed in the local community. Texts were read to the class during a writer’s conference, then changed and edited, first in pairs of pupils with differing competences and ultimately with the teacher, before being published. During this project I noticed how intimately all the languages present in Luxembourgish classrooms interrelate when pupils engage in language processes, be it talking, reading or writing. The children were swiftly switching between all the languages at their disposal whenever they felt the need to be understood. Children’s languages were not confined to the narrow territories of curriculum domains but emerged every time pupils wanted to exchange ideas. Even the separation between talking and writing, between oracy and literacy appeared to be an artificial one. Eventually the children fell back on oral exchanges whenever they felt the need for making sense of written products. The experience with the writer’s workshop revealed so much communication around the autonomous and collaborative process of writing that the idea was born to design the TEO tool as a piece of software that would allow for the same amount of dynamic and authentic communication to appear during oral productions.
TEO (Text Editor Oral) was developed and updated with the help of programmers. A technologically enhanced version of TEO is commercially available under the name of TiParlo at www.tiparlo.com.

TEO is a highly versatile oral word processor that encourages the development of oral expression skills in both native and foreign languages. It offers an attractive, user-friendly environment for oral expression through story building in class and is easily accessible even to children and teachers who have had little experience with information technology. The user interface is presented in the form of a blank page similar to that of a word processor with a traditional but simplified menu bar at the top of the screen on the left.

![Figure 1: Screenshot of the TEO tool and software](image)

Pupils work at the computer in small groups of two or more taking turns to input their sentences, although individual work is possible as well. This work can be done in the classroom, but in order to promote autonomy, pupils could work in an adjacent space. Pupils from other grades as well as other persons can assist those working with TEO.

The children first click on the microphone to start the recording process. A neutral icon, shown in grey in Figure 1, is displayed representing the recorded oral text. A second click deactivates the microphone and the computer repeats the recorded speech so that the children have immediate feedback on the quality of their production. This repeating function can also be switched off by clicking the parrot icon. The total time of the accumulated recordings is given.

Icons are numbered consecutively as they are placed on the page one at a time. They 'contain' the users’ recording. It is possible to attach captions to the icons. In these cases the text will replace the numbers. Icons can be placed on the desktop, rearranged in sequence or disposed of at any time in the trash bin. Whenever a recording has been placed in the trash bin it can no longer be retrieved by anyone. This was a deliberate
programming decision intended to guarantee the children’s responsibility and freedom in the language production process with TEO.

At the bottom of the screen there is a selection of icons which children are free to place onto the neutral icons in order to highlight particular parts of the discourse. It is possible to add new icons to the icons library. Some children, especially in kindergarten, spontaneously used the icons with popular comic figures to create stories involving these familiar characters. TEO does not directly invite the storyteller to follow predetermined rules when producing stories. Instead, it provides a context where learners can rely on their own resources and make use of TEO for validating their own choices by auto-evaluating their performances.

During and after recording, the story can always be edited by deleting, re-arranging or re-recording icons. All these actions are in principle provisional and can be undone and redone indefinitely; a point that I will investigate later. The users of TEO can decide for themselves about the length of the recording. They can record a sound, a word, a sentence or a whole story under one icon. This allows for interesting initiatives such as the combining or mixing of various pieces of oral discourse; a point that will be explored through the analysis of the empirical data to be presented later.

In the mode of use that is considered here children record only in the target language while the production process can encompass other language resources at the disposal of the children. The transcribed data allow to investigate the switching between the target language French and the common language resource Luxembourgish that is used by the children for the elaboration and clarification of what is recorded.

I will now set the context for the use of TEO in Luxembourg’s preschool and primary multilingual classrooms.
3.1 A rationale for using TEO in Luxembourg’s multilingual classrooms

The development of the use of TEO is dependent on Luxembourg's sociocultural context where several languages prevail simultaneously. It is often bemoaned in educational discussions in Luxembourg that the prevalence of language learning from the early years on comes at the cost of the development of pupils' competences in scientific domains. The search for a common multilingual identity is an evergreen in the political and educational discourse in my home country and hence I feel the need to acquaint the reader with a description of Luxembourg's community of language users.

3.2 Luxembourg’s community of language users

With its 502,100 inhabitants (Luxembourg, 2010) and an area of 2,586 square kilometres located between France, Germany and Belgium, Luxembourg is the smallest country in the European Union. As 43.1% of the population are of foreign descent, Luxembourg is characterised by its multiculturalism and multilingualism, these having strong implications for the whole of the country’s school system as will be outlined in the next section. Due to its geographical and historical situation, Luxembourg has always been a multilingual country born out of the co-existence of two ethnic groups, one Romance and the other Germanic. Both ethnic groups have to co-exist in the school system where, despite the increasing importance of Romance ethnic groups, basic literacy continues to be introduced uniquely through the German language and orthography.

Historically Luxembourg has been a country of immigration for about 100 years with several waves of Italian workers employed in the steel industry. From the early seventies a wave of Portuguese workers has been arriving in Luxembourg with Portuguese people making up approximately 15.9% of the total population in 2010. Adding to the complex multilingual situation is the fact that about 150,000 Belgian, French or German people, i.e.
more than a quarter of the total population, each day cross the border to work in Luxembourg. More than 50% of the jobs are currently filled by immigrants or international commuters. In the wake of international turmoil, Luxembourg like many other European countries has witnessed increasing arrivals of refugees.

Moving around in such a polyglot environment requires subtle mastery of the three official administrative languages of the country (Luxembourgish, German, French) complemented by English as the first foreign language mostly used in the banking industry. The language law of 1984 has established Luxembourgish as the one and only national language, the language for integration of the many different populations; a political decision that has led to a revival of the Luxembourgish language in its written form. Luxembourg's linguistic situation constitutes a field for the interanimation of languages (Bakhtin, 1981) where the unitary system of norms is always to be questioned and where languages and cultures are ongoing and unfinished tasks or projects forever submitted to the complexities of everyday living on the background of the given sociocultural context (Saul Morson and Emerson, 1990). This usual and normal practice of multilingualism leads into the questioning of the validity of boundaries around languages. When languages interanimate dynamically, as in Luxembourg's sociocultural context, it might be judicious to question the notion of code-switching referring to the interplay of hermetically sealed language units. Garcia (2009) prefers the notion of translanguaging for describing this process where languages leak into one another.

In the following section I will outline the multilingual teaching and learning context into which TEO must fit in order to play out its potentialities.

3.3 A role for TEO in Luxembourg's multilingual teaching and learning context
It is important to stress that in Luxembourg’s primary and secondary schools curriculum subjects are traditionally taught either in German or in French, Luxembourgish not necessarily being the common language in the classroom. In this multilingual context literacy in two or more languages is fostered simultaneously within a short number of school years. Schools however tend to sever language from the context of its use and control it by imposing a standardised model of school literacy (Cook-Gumperz, 1986) that artificially separates the languages in the official curriculum. Schools also persist in conceptualising language and literacy – the greatest forces and mediators of socialisation (Sapir, 1985) – as de-contextualised knowledge separate from social dialogue (Dyson, 1993). Luxembourgish schools tend to lack the dynamics, flux, improvisation and heterogeneity of their multilingual and intercultural setting (Rosaldo, 1993). It may however be that language learning is much more unsystematic, especially in a multilingual and multicultural context, than we tend to believe, due to a lifetime spent in structured and pre-planned formal lessons.

The shortcomings in the development of oral language skills in the Luxembourgish school environment where receptive skills are privileged (Baetens-Beardsmore, 2003) have been outlined. The French oral language produced by pupils comes close to an oral version of written language (Gretsch, 1994). The following weaknesses in the French oral language skills of Luxembourgish children have been identified: tentative phonological skills, lack of syntactical precision, a certain lack of mastery of sociolinguistic discourse rules and a lack of tolerance for discourse variability (Baetens-Beardsmore, 2003). Even the latest official documents on language learning published by the Ministry of Education (MENFP, 2007, 2008, 2009) reflect a well-known bias in that many theories, documents and tools of linguistics that are supposed to deal with ‘oral language’ or ‘language’ in short actually deal with ‘written language’ (Dufva, 1998). The written tradition represents the
hidden agenda when it comes to outlining educational policies in the domain of the learning of oral language skills in Luxembourg.

Could TEO and its associated concept of storying, which I will outline in detail in a chapter on its own, then become the setting and the tools for overcoming these weaknesses? Can TEO function as a tool for maintaining the pupils in a language learning and language production process that reflects the complex multilingual situation in Luxembourg’s classrooms? Can the TEO tool be seen as an organiser of a setting that encourages children to inter-animate their language resources and to profit from code-switching or translanguaging between Luxembourghish and French for the elaboration of the French target utterances to be recorded?

The construction of stories mediated by the use of the TEO tool could create a complexity and connectedness in language learning which is all too often lacking in the classrooms where discrete items and skills monopolise a large part of the schedule. In such a case TEO might offer opportunities for language development as it is intended to take place in a transactional context with spaces for interpretation and negotiation of meaning and texts. From a transactional point of view TEO can be envisioned as a mediating tool for making meaning of the narrated stories as well as of the narrative event (Bauman, 1986).

In some respects, TEO also provides learners with a permanent record of an interpersonal event or of the interpersonal practices with languages that they have used. That particular stretch of discourse, e.g. a finished story, might become an essential tool for evaluating oral language skills in the target languages of the official curriculum. The recorded voices of the children will provide evidence of their differentiated oral language skills in contrast with the established practice in Luxembourg’s schools that relies heavily on incorporating reading skills for in the evaluation of oral language skills in French and German (Stammet et al., 1994). It will be particularly interesting to see if children will use
TEO in order to auto-evaluate and eventually correct their oral language productions in the target language. In what ways can this feature sustain the joint language production process? When will the children activate this special kind of resource? Can the TEO tool replace the permanent action and intervention of the teacher in the evaluative process with a system of activities, mediations and institutions (Vasquez and Oury, 1967) that guarantee a continuation of the language learning and production process even for the weakest members of the team? The analysis of the empirical data provides instances for investigating the role and function of TEO in most of the aspects mentioned above.

By design, TEO can bring together the different languages that are spoken in a particular classroom. Pupils can use their own language in the process of creating stories in the target language of the curriculum. It is then legitimate to envision a simultaneous use and the equality of status of all the languages spoken (and written) by the pupils. In turn we might come to question and even disregard labels such as native language or second language learners. Excessive labelling may lead to misleading assumptions about children’s learning, usually involving a required set or sequences of skills. In Luxembourg’s primary classrooms pupils often lose confidence as they are confronted with a language that is not their mother tongue. All of them have to follow a clear-cut sequence from the teaching of Luxembourgish in preschool to that of German in the first grade and to that of French in the second grade. In contrast, enabling the children to create stories with TEO might offer possibilities for language learning in any target language while respecting the native language skills of all children. Official figures for 2008-2009 (MENFP, 2010) in Luxembourg indicate 49.5% of children of foreign origin in kindergarten and 44.2% in primary school with an average of 24.6% of Portuguese children as the most important group of foreign origin in kindergarten and in the six primary grades.

The competences of these children could be tapped in order to promote language learning in a multilingual and transactional context. By using TEO throughout the
curriculum, children’s strengths and weaknesses could potentially be balanced. For instance, Portuguese children with manifest competences in oral French can assist Luxembourgish children who themselves might help their partners when it comes to creating stories in German. When working with TEO, French could be for some children a first, a second, a third or even a fourth language. In the case of an English pupil in the first four years of the Luxembourgish school system, English would be the first language, Luxembourgish would be the second language in the kindergarten, German would be the third language in the first grade and French the fourth language in the second grade.

As TEO was designed with the concept of storying in mind, I argue that in order to pursue my fundamental question about its role and function in language learning and production, it is equally important to consider the role and function of storying in language learning generally and in the context of sociocultural learning theories. In a similar way as play is considered to be the leading activity in the development and learning of children (Vygotsky, 1978, Newman and Holzman, 1993) I will treat storying as the leading activity in the joint production and learning of language in the TEO setting. I will argue that storying accompanies, continues and extends the learning possibilities instantiated through play (Holzman, 2009). Such a view would also prevent play from being disposed of at the threshold of children’s entry into primary school.

Although I provide a detailed description of the association of human and nonhuman actors in the analysis of the empirical data below, there is still a need for elucidating what actually associates these actors in the educational arena. I must therefore provide an account of the interactional work that goes on between human and nonhuman actors and make visible the particular embodied practices of the language learners where the foreign language is produced in the form of a story (Button, 1993).

What then is the glue that brings the disparate elements or actants in the network together? In the instantiation of the TEO tool I will show that it is precisely the activity of
storying, of making stories, that embodies this association. The connective device of storying provides the frame for associating the human and nonhuman actors. The language produced by the system or collective of actants in a given setting is supposed to be a product of its working order, of its activities and interactions (Button, 1993).

I now explain why I choose the notion of the TEO team to refer to the system or network of human and nonhuman actors producing and performing language with TEO.

3.4 The notion of the TEO team

The notion of the TEO team refers to the activity of a collective subject engaged in language production and learning. This collective is seen as ‘the condition of possibility for the individual whose development involves protection, learning, and relations’ (Stengers, 1997, p. 16). Lektorsky (1984) introduced the notion of the collective subject as existing outside particular individual subjects. The collective subject or, in my case the TEO team, reveals itself through external, collective activity, rather than through individual consciousness (Davydov, 1999). All members of the team can attend to the information and the tasks and activities it supports in distinctive but closely related ways. Activities and the information that serves them can become accountable features of the work for those who need to know, i.e. the learners, and those who have the ‘know-how’, i.e. the experts (Harper and Hughes, 1993). The focus of the language learning process with TEO is not the individual but the individual-in-a-team.

As noted, the team, or collective subject, unites not only human members but could also incorporate the nonhuman actors in the storying process. It will be fascinating to follow this collective of actants in an exploration ‘of what holds with what, of who holds with whom, of who holds with what, of what holds with whom’ (Latour, 1999, pp. 162, 163). The TEO team then constitutes a corporate body where human and nonhuman actors exchange human and nonhuman properties (Latour, 1999).
Through the analysis of the role and function of the TEO tool in the language learning sequences transcribed below I will explore how the TEO team circulates knowledge, reproduces the production processes and checks how things are going (Harper and Hughes, 1993) while being held together through the storying process. In stark contrast with the generally positive view of the constitution and performance of teams in everyday professional and family life, the team metaphor does not figure prominently when it comes to the learning and performing of language skills in school. This is all the more astonishing as learning and eventually mastering a language generally presupposes a collective, communicative and interactional situation where people are simultaneously working on a specific task. The insistence on sociocultural learning theories does not prevent the school-based learning of languages from being reduced to the individual mastery of languages, an attitude that is reinforced by testing procedures that aim at identifying the strengths, competences and shortcomings of the individual pupil, be it in the written or even in the oral mode. Most of the criteria that refer to the testing of oral competences appear to be derived from the written mode, a mode that represents ‘one of the main procedures through which the ground within which language emerges is systematically erased, made invisible, and excluded from analysis’ (Goodwin and Duranti, 1992, p. 32). Hence, it is very difficult to conceptualise oral language learning as a team effort, which cannot be achieved or completed without the presence of other interlocutors. The team effort will be scrutinised and become visible in the analysis of the data of this thesis. In my thesis I argue that the inseparable unity of the TEO team cannot be split up into its constituents without losing the character of the language performing unit constituted by the human and nonhuman actors as sketched above.

The concept of storying has been adopted as the main pedagogical concept underpinning the process of language learning and production with TEO. Human actors use storying for encoding a social and cultural history (Gutiérrez and Stone, 2000) in a
setting where human and nonhuman actors like TEO enact different roles. The process of storying brings and keeps the human and nonhuman actors together in the TEO team or collective, as it strengthens their cohesion and accelerates their circulation (Latour, 1999) and as it contributes to the resilience of the language learning process as will be explored in the analysis of the data. The concept of storying then acts as a foundation whereupon the research question about the role and function of TEO in the language team production process can be meaningfully asked.

As storying is an essential concept in the design and development of TEO as well as in the organisation of the related language learning setting I will discuss its characteristics in a detailed account.

4 The concept of storying – leading the activity of human and non human actors

‘(...) we represent our lives (to ourselves as well as to others) in the form of narrative (...). (...) human beings make sense of the world by telling stories about it – by using the narrative mode for construing reality. (...) [Tales are tools,] instrument[s] of mind on behalf of meaning making.’

Jerome Bruner (1996, pp. 40, 130, 41)

The concept of storying should not be confused with the concept of story-telling. Storying characterises the original production process of a story by one or more persons. In the case of a group production of a story the communicative activity of the group members is of the utmost importance. The focus of storying lies on the productive activity with others. This is in contrast to story-telling where a finished product is told to others. Storying refers to the process of designing a story with all available means, thus allowing for the presence of tools like pens, typewriters, word-processors or the TEO software (Jewitt and Kress, 2003). The design process of storying relies on personal histories
characterised by individual voices and personal intentionalities. Things and events that matter to people are interpreted in the storying process (Lantolf and Pavlenko, 2001). Stories circulate between the human and nonhuman actors of the TEO team. At times, TEO is put to the front of the stage, as will be explored in the analysis of the transcribed data. In story-telling the locus of control over the process is largely within the text as opposed to storying where the locus of control is within the discourse of the authors. In storying children can bring in their own sense of words and language, a point that will be explored through the analysis of the data in the transcription.

Children often enact scenes from the storying process when playing. Storying and play are then activity spaces or shared contextual frameworks for joint action (Van Lier, 2004). Storying and play can create discursive spaces that contribute to the development of children’s competences because they have the power to compel, to lead us to reflect, to involve us personally and to transform our practice (Rosen, 1986). I will now outline the parallels between storying and play as leading activities in children’s cognitive and emotional development. For this purpose, I regard a leading activity as contributing in a decisive way to the development of the child by promoting new actions and psychological processes that anticipate a new episode of development (Leont’ev, 1981). In a leading activity, new forms of actions and motivations are emerging in the performance of children (Van Oers, 1999). In my view, storying adds continuity to this developmental process. The mediation through tools and other people within the storying process leads to new motives and abilities, providing the basis for transition to the next period (Karpov, 2003).

Composing stories may originate in the solitary or the social play of children with puppets, dolls, toys or other artefacts as well as in dramatic role-playing with companions and siblings. Storying with and around concrete objects often produces fragmentary narrative constructs that may even extend into the early writing of stories (Cassirer, 1985, Gundlach, 1982). Through their playful activities children very early on learn to follow,
construct and tell stories. They internalise narrative structures as cognitive artefacts (Bruner, 1990) that perform the ‘paradigmatic’ function of narrative, i.e. providing a kind of annotated template for future actions in similar situations (Olson, 1995).

Children play with language, its sounds, its structures and functions, also alone in pre-sleep monologues (Weir, 1962) where they rearrange recent actions and communicative acts or lay plans for future actions and their contingencies (Bruner, 2001). This intentional play with language, word forms and meaning, the length of the monologues and the ease with which they are managed can be considered as an instance of a meta-language.

Language is itself mastered through representing and interpreting in linguistic and narrative form (Applebee, 1978, Nelson, 1989), through commenting on former comments and through turning former comments into topics; a process Feldman (1988) termed ‘ontic dumping’. Narrative frames can lead to the development of problem solving and of fantasy or imagination (Fleisher Feldman, 1989). Vygotsky has stressed the importance of the link between play and imagination when saying that ‘Imagination in adolescents and school children is play without action’ (Vygotsky, 1978, p. 93). Similarly Paley (1990, p. 6) points to the inevitable link between play and storytelling: ‘Play and its necessary core of storytelling are the primary realities in the preschool and kindergarten, and they may well be the prototypes for imaginative endeavours throughout our lives.’ Hence, the developmental potential of play and storying should be mobilised in formal school activities and not be confined to informal preschool or playground activities (Holzman, 2009).

Play and storytelling then can be said to provide the universal learning medium (Paley, 1990) or original learning tools (Paley, 1997) for young children inside and outside the classroom. Narratives are found universally across cultures (Miller and Moore, 1989), a fact that gives stories and the storying process leading roles in the learning processes. Storying is a robust human activity that not only cuts across diverse sociocultural
traditions, but also flourishes even without an explicit model for narration (Goldin-Meadow, 2005) as in the case of deaf children’s language learning. In the context of my thesis, storying as a leading activity happens when TEO is used for producing stories in a multilingual context.

The analysis of my empirical data explores how storying with TEO propels the language learning process despite stressful and emotionally challenging conditions in the learning experience of the TEO team.

Building on children's multiple language and meta-language competences, i.e. treating and interpreting languages as both the medium and object of study (Heath and Mangiola, 1991), will be specifically addressed in the analysis of the role and function of TEO. TEO may serve as a medium for facilitating exchanges, particularly for children who have difficulties in expressing themselves orally in formal classroom situations. For instance, Portuguese children who are struggling with the German-based literacy instruction can act as experts when it comes to the oral instruction of French. Such opportunities for collaborative knowledge building are offered by a curriculum where most of the languages spoken by one or another category of pupils figure as a compulsory subject matter.

TEO allows for the documentation of children’s oral language productions and developments. Oral recordings can figure prominently in pupils’ portfolios and provide evidence for the rating of oral language skills. They are a pervasive resource for auto-evaluating one’s own progress in the target languages and one’s own continuous use of larger chunks of language, a point that I will discuss in the analysis of my data.

In the remainder of this chapter I will discuss a series of concepts that, I will argue, link powerfully with the notion of storying. I will begin with the notion of utterance as the basic characteristic of this practice.
4.1 Storying and utterance

The notion of utterance characterises language that is produced in dynamic lived situations. Its dynamic nature contrasts with the static nature of sentences as embodied in textbooks. Utterances are performed and completed in the actions of the whole body, which never appears in the treatment of sentences that are isolated from the living context. Uniqueness and unrepeatability are main characteristics of utterances: ‘Sentences are repeatable. (...) each utterance is by its very nature unrepeatable. Its context and reason for being differ from those of every other utterance, including those that are verbally identical to it. (...)The reasons we speak, the very reasons texts are made, lie in what is unrepeatable about them’ (Saul Morson and Emerson, 1990, pp. 126, 127). Hence, utterances are the propellers in the storying process as they carry the contextual overtones of unique lived situations, of events, where meaning needs to be constantly constructed and negotiated. Utterances organise, mediate, coordinate and maintain culturally organised activities through which children develop the appropriate linguistic tools (Cole, 1996).

It is difficult for schools to work with the concept of utterance if they use exercises from tests and textbooks that are based on isolated words for vocabulary or on simple sentences for grammar for evaluating language competences. Meaningful language is instantiated in interactions often involving larger chunks of language than those prevalent in standardised exercises (Halliday, 1978). An utterance never expresses a speaker’s or a writer’s individual intentions only. On the contrary, an utterance is ‘a product of the reciprocal relationship between speaker and listener, addresser and addressee’ (Voloshinov, 1973, p. 86), whether present or not, whether real or presupposed. The storying process with TEO creates a context for reciprocal relationships that propel the language learning process.
In a multilingual context, it is essential to maintain culturally organised activities in the classroom that come close to those experienced by the children in their sociocultural context and that embody a form of practice rather than a system that works independently of ongoing actions (Knoblauch, 2000). Paradoxically, educational authorities define the target competences ahead of the learners’ practical actions. This inverts the process of becoming competent in some matter, where a ‘series of performances precedes the definition of the competence that will be made later the sole cause of these very performances’ (Latour, 1999, p. 119). Solo performances all the more exclude extended discourse, which is notoriously rare in formal second or foreign language learning situations (Swain, 2000).

Bakhtin (1986, p. 107) links utterances and texts with human embodied actions: ‘A human act is a potential text.’ Corporeal behaviour and emotions can then be transformed and developed into meaningful language as I will show in the analysis of the data. Utterance defined as a deed treats the partners in dialogue as active and productive, evaluating each other’s utterances and eventually extending action into the future (Holquist, 1990). Hence, children are authors in the discourse (Wells Rowe, 1994) as they speak, discuss and record all sorts of utterances from short interjections to long stretches of discourse within the whole spectrum of their bodily behaviour. A particular emphasis in my thesis is on the special practice of breaking up larger chunks of utterances into their constituent grammatical parts, a practice that is deliberately instantiated by the human actors in the TEO team at various moments in the storying process. Language performances are then circulating between the human actors and the nonhuman actor TEO during these particular moments in the storying process.

In their practical work with TEO in a multilingual context, the children create utterances that locate them in a specific context and that provide them with a definite place in time and space.
4.2 A place in time and space

Stories and utterances emphasise the central function of time and space in human processes (Polkinghorne, 1988). Time and space can be contracted or diluted (Calvino, 2009) within stories that typically present a syntactic shape of ‘beginning-middle-end’ or ‘situation-transformation-situation’. Within this frame human concerns are uttered (Scholes, 1985). Stories ultimately come to define our own life history: ‘Once a story is told, it ceases to be a story: it becomes a piece of history, an interpretative device’ (Steedman, 1986, p. 143). Storying then allows for reaching back to the past and for projecting oneself into the future. It generally encompasses larger stretches of narrative space than children are usually granted in Luxembourg’s formal school settings where they generally move from task to task in pre-planned and book-based activities. Storying provides the necessary space and time for events that are organised by their placement in much larger sequences (Goodwin and Duranti, 1992). TEO allows the children to refer to utterances that are located in a time before the present moment as their place is represented by a particular icon on the screen. The children can reach back and forth and mobilise previously recorded utterances for present purposes.

The construction of narratives with its sequential ordering of time helps to establish a temporal sequence in one’s own life (Fox, 1993). Children are told and read many stories that begin with ‘Once upon a time’, a line that immediately alerts the audience to the rules of storytelling (Mallan, 1998) and that establishes the sequential time frame. Stories are always sequential, even if only in a rudimentary fashion, as exemplified by children’s early oral stories and rhymes: ‘I'll tell you a story - About Jack and Nory - And now my story’s begun.’ (Opie and Opie, 1980, p. 233).

Stories and utterances instantiate a sequence of events linked by causes and intentions.
4.3 A sequence of events linked by causes and intentions

Stories can be referenced as *sequenced and interconnected events* (Nelson, 1989, Rosen, 1993). In narratives, temporal sequences are immediately linked to causal ones. Narratives, from the basic ones to the more developed ‘bed-to-bed-stories’, juxtapose events that will be linked by temporal conjunctions later on. A sequence of events is organised around a sense of an ending (Kermode, 1967) shaping the plot or story. A simple title of a story such as ‘La Famille (The Family)’ chosen by the children in my transcribed data at the onset of the recording process will establish a commitment within the group for completing the intended storying line.

*Causality and intentionality* are present in the earliest examples of children’s narrative constructions (Fayol, 1985). Children’s early experience of conversation is shot through with intentions (Wells, 1999) and with unpredictable human emotions, desires and value judgments (Kramsch, 2002). In this light, school lessons can often be referred to as rather messy conversations (Lampert, 1992) as they mix up different and surprising intentionalities arising from all the participants, with the teacher’s intentions dominating the discourse for most of the time. Storying however is inextricably linked to pupils’ questions about the nature of the world and about their own role in the cultural fabric as evidenced by four-year old Seriozha: ‘I'm a why-er, you are a because-er!’ (Chukovsky, 1963, p. 31).

Causality and intentionality also populate cultural artefacts assisting children, parents and other caregivers in their narrative attempts: toys, dolls, teddy-bears, pictures, picture books, videos, television, computer screens among others. Such artefacts often end up in children’s beds where they help to structure the temporal sequence of everyday activities, of pretend play and bed-to-bed stories. In the analysis of the role and function of TEO in my thesis I attempt to identify the intentionality that resides within the TEO tool and that at times may cause the children to continue with the storying process.
Cultural artefacts are used for collaborative storytelling and joint ‘reading’ sessions in our Western culture where children and caregivers often engage with a sequence of pictures in a book. Early on the child will learn that stories have a beginning, some development and an end. The relative lack of text means that a picture book is rich in narrative spaces that must be filled in by the reader, thus providing enough space for imagination and fantasies (Whitehead, 1990). Parallels between the scarce TEO display and the narrative affordances of picture books might be legitimately drawn. With the help of the title, of a word or a sentence or the pictures the child will actively participate in the co-construction of narrative discourse by asking questions like: ‘What will happen now?’ or ‘Is this the end?’ or ‘Haven’t we forgotten something?’ Often the child comes to influence the development of the story by referring to the anchor points provided by title, word, sentence or picture.

Young children make considerable use of intonation in order to mark meanings and to signify that ‘this is a story’. Though often losing the thread of the story itself, they rarely lose control of the tune. In reading with an adult, children sometimes engage in echo-reading, thus 'shadowing' the adult's voice and intonation (Barrs, 1992). Similarly children echo-read the multiple voices of television, radio, commercial and other specific narrative genres. Co-vocalising and sub-vocalising, which could be named echo-vocalising, figure prominently in the analysis of the transcription of my thesis.

Stories as sequenced events linking human intentions and ideologies also thrive on the use and development of metaphors.

4.4 Storying and metaphors

‘What, then, is truth? A mobile army of metaphors, metonymys, and anthropomorphisms - in short, a sum of human relations, which have been enhanced, transposed,
and embellished poetically and rhetorically, and which after long use seem firm, canonical, and obligatory to a people.’

Friedrich Nietzsche (1962, pp. 46, 47)

Telling literal and factual stories is not our daily business. We altogether prefer to ‘craft the sensual and metaphoric, rather than the literal, properties of speech’ (Dyson and Genishi, 1994, p. 4). We try to establish and maybe impose our own ideological worldview through the musical and image-making features of language. Rhythm and rhyme, figures of speech and re-voiced dialogue fill the toolbox of every child on his/her entrance to school and are used for borrowing or resisting particular language patterns as proposed or imposed by their more capable peers. The empirical data transcribed in my thesis will reveal examples of borrowing and of resistance concerning particular sentence patterns or particular words or names.

Metaphors allow us to see and interpret one thing in terms of another. They have a basis in our physical and cultural experience (Lakoff and Johnson, 1980). Metaphors are pervasive in everyday life, in language, in thought, in action, as abstract philosophical concepts, including time, causation, morality, and the mind, are all conceptualised by multiple metaphors (Lakoff and Johnson, 1999). Storying provides an exceptional frame for using metaphorical concepts and, especially in the case of children, for putting them to test, thus establishing a frame for the construction, interpretation and negotiation of meaning.

4.5 A frame for the construction, interpretation and negotiation of meaning

Children will use explanatory and exploratory talk in and around stories in order to explore and to explain the workings of the material and cultural world in the same tentative
and maybe futile way as adults do. Explanatory and exploratory talk refer to a dialogical model of reasoning where different voices inter-animate each other in a way which not only constructs shared knowledge but also critically assesses the quality of that knowledge (Wegerif and Mercer, 1997). I conceive of storying as a frame for interpretation and negotiation situated within conversations aiming at making meaning of the events and the persons of our lives (Nelson, 1996). Meaning making is dependent on the cultures of the voices involved as ‘meaning is not a given, but something made by human beings as they negotiate the world. Meaning is a cultural, not computational, phenomenon’ (Bakhurst and Shanker, 2001, p. 2). Stories are experienced as cultural productions because through telling their stories and listening to each other’s stories, and through careful questioning of each other’s stories, children recognise the ways in which their particular stories intersect and overlap with the stories of others (Davies, 2000).

The construction, interpretation and negotiation of meaning also go along with emotions and with a view to exploring the influence of emotions on the participants’ language learning with TEO. I will now discuss the emotional dimensions of learning in regular classrooms.

4.6 Storying, emotions and formal schooling

Formalised educational settings often show no tolerance for uncertain, sketchy, hazy, ambiguous, confused and non-articulate ways of knowing and learning that are deemed essential for expanding the students’ capacities to learn (Claxton, 2007). Storying however is characterised by emotional, volitional, intentional and intuitional factors actualised in utterances, in body postures, in gestures and in facial expression. Emotions mark off the singularity of each dialogic situation and the particular responsibility of the participants (Saul Morson and Emerson, 1990). Emotions have an undeniable impact on the nuances of the intonation of words and sentences, on the rhythm, the rapidity and the intensity of
the dialogue. Children are immersed into the rhythm of their mother’s language already in the womb and may thus be predisposed at birth to the rhythmic patterns of their mother tongue (Halliday, 1985). The affective nature of early interactions acts as a crucible for the forging and the development of language skills (Shanker and Taylor, 2001) because affective markers are indicators of orientation to the task (Donato and Lantolf, 1990) as well as of the presence of mutual help (Donato, 1994).

Formal school settings make it difficult for children to initiate interactions and to accentuate their own discourse by what Bakhtin calls ‘living intonation’, an intonation that is always expressive as it is intimately linked with the contents of the discourse (Bakhtine, 1977). It may even be that an emotional-volitional tone or intonation is all an utterance conveys, as in the case of meaningless words or mere interjections. Lengthened or doubled words are often accompanied by silent intonations, i.e. gestures (Saul Morson and Emerson, 1990). Lengthened words like ‘Eeh’ or ‘Uuh’ display a very immediate response to the speech and nonverbal behaviour of co-interactants and hence play an important role in the joint and emergent construction of social context and meaning (Philips, 1992). The transcription of interactions around TEO will be examined for such instances.

Schools often do not allow for longer stretches of discourse where the above features of language use would appear. Most of the time discussion of and about language is limited to purely referential dimensions whereas emotional-volitional dimensions are virtually excluded. By privileging neutral and stable meanings of words (Vygotsky, 1986), schools foster a passive attitude towards language that cannot be maintained whenever we have to show an active and responsive understanding of our interlocutors in daily dialogues (Bachtin, 1979). It is no wonder that people remember language input only poorly when it is removed from the affective and volitional context in which language normally thrives. The importance of affective attitudes on remembering (Bartlett, 1995) is
often downplayed as schools as institutions shy away from the corporeality and the sensuousness, the temporality and the social dynamism of the real people they have to deal with (Mannheim, 1985).

It may well be that our emotions would seem to be expressible only in narratives (Egan and Gajdamaschko, 2003) and through the process of storying that will let the children do or perform their emotions (Gergen, 1999) within a context they have chosen freely and voluntarily. There will be a space for body movements and verbal expressions that come to be characterised as disruptive in formal classroom settings. Children are generally very tolerant of such disruptive behaviour as they are well aware of its temporary character. They know that it will not impact on the development of their activities and of their stories (Paley, 2001). I will explore the transcribed data and especially the video captures in my thesis for instances of the children doing their emotions while using TEO for recording their own story and while negotiating the content and form of the recordings.

4.7 Storying as the practice of learning in zones of proximal or potential development

Vygotsky’s concept of the ‘zone of proximal development’ might be helpful in analysing the learning and development that take place through stories in a construction site of interpretation (Brockmeier, 1996) between the children. In order to emphasise the potentialities for development and learning hinted at through the metaphor of the zone, I prefer to replace ‘proximal’ by ‘potential’. The notion of ‘proximal’ remains close to a sequential description and a mechanistic interpretation of developmental steps. The notion of ‘potential’ however encompasses the developmental potentialities of the total personality immersed into the language learning situation. Storying with TEO can allow for the continued development of the human potential latent in all the children in our classrooms. Through the analysis of the role and function of TEO I will try to reveal a
complex set of social and semiotic dynamics such as implicature and prolepsis that serves to encourage an interlocutor to construct and share the speaker's perspective (Stone, 1993).

With the ‘zone of proximal or potential development’ (ZPD) Vygotsky gives us a tool for describing the social context of the language learning process. The ZPD is ‘the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’ (Vygotsky, 1978, p. 102). Cole (1985, p. 155) is opting for a broader definition fitting the principles of our discussion: ‘I would like to treat the idea of a zone of proximal development in terms of its general conception as the structure of joint activity in any context where there are participants who exercise differential responsibility by virtue of differential expertise’.

A process of transition from inter-psychological to intra-psychological regulation does not only happen in collaborative contexts where some partners are ‘more capable’ than others, but also in a situation where partners may assume separate but complementary social roles of performing, observing, guiding, and correcting (Forman and Cazden, 1985). By his members working together, the group as a whole is able to construct solutions in a difficult task even if no member has expertise beyond his or her peers (Wells, 1999), thus suggesting the non-additive nature of human learning and interaction (Zuckerman, 2003). Zuckerman (2003) points to the need of resisting the expert’s dominant role, as its acceptance all too often leads to an unreflective repetition. She emphasises the importance of interaction with inexpert equals as necessary for releasing and developing reflective capacities in children. Expert and inexpert equals’ roles in the TEO team’s language learning will be given prominence in the analysis of the empirical data of my thesis. Working collaboratively in the ZPD might also enable some participants to remain silent at the beginning of the learning process without producing language. Such a ‘silent
period’ is important for some children in order to gain confidence before entering the language production process (Dulay et al., 1982, Ellis, 1992).

The concept of the ZPD represents the practical pedagogical enactment of Vygotsky’s general statement about the social origins of individual mental functioning: ‘Any function in the child’s cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. (...) Even when we turn to mental [internal] processes, their nature remains quasi-social’ (Vygotsky, 1981, pp. 163, 164). It is important that the structural endpoint of a mature cognitive (and emotional) activity figures as a precondition for this new structure of activity to appear as an individual psychological function in the child (Cole, 1996). The final form actually interacts with and exerts a real influence on the first steps of the child’s development: ‘Something which is only supposed to take shape at the very end of development, somehow influences the very first steps in this development’ (Vygotsky, 1994, p. 348).

The very act of storying already prefigures the final story listened to by the children and their partners. The work with storying in the ZPD entails membership and participation in a community of practice, i.e. ‘in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities’ (Lave and Wenger, 1991, p. 98). In the definition of the ZPD we must include the active child as appropriating and developing new mediational means for his/her own learning and development. The units of study are then active subjects within diverse and dynamic social environments (Moll et al., 1993). In view of the points above the ZPD instantiates a dynamic perspective on learning full of upheavals and reversals where the children’s inherent potential must always be at the core of the learning experience. The Vygotskian approach emphasises process over product and takes child development from
the perspective of \textit{potential growth} of the child (Robbins, 2001). The notion of potential can be linked to that of performance, so that we can consider the process of storying as embodying forms of life and of performance.

\textbf{4.8 Storying as a form of performance}

Within the ZPD the activities that take place, such as speaking a language, can be viewed as a form of ‘performance’ (Wittgenstein, 1953). The ‘zone’ is then created in a total environment where Wittgenstein’s language-games are performed as activities such as the following one, which engages a twenty-one-month-old boy and an adult:

\begin{quote}
‘CHILD: (opening cover of tape recorder) open/open/open
ADULT: did you open it?
CHILD: (watching tape recorder) open it
ADULT: did you open the tape recorder?
CHILD: (watching tape recorder) tape recorder’
\end{quote}

(Bloom et al., 1974, p. 380)

In this conversational performance the boy’s rudimentary speech is an incentive for an exchange on the function of a tape-recorder. He engages his adult partner in a speech act where the adult’s interventions serve as an input for further structuring of the exchange. The boy continues with a creative imitation of the more developed speaker’s speech. It is not the mimicry that some parrots and monkeys do. It is what makes it possible for the child to be a head taller than she or he is (Vygotsky, 1978), that is to learn by \textit{performing} (beyond her/himself) as a speaker and hence to develop his/her potential for language learning and learning in general. The adult as the more developed speaker completes the child in the same way as Vygotsky maintains that speaking completes (rather than
expresses) thinking. In the process the child speaks and creates something new (open it; tape recorder) by imitating some part of the adult’s utterances (Lantolf, 2000). It is the young child who by virtue of his/her own actions, utterances, body postures, gestures and facial expressions provokes conversations and hereby creates meanings that will make sense and that will be translated/transposed into the terms of the adult language (Halliday, 1975). Creative imagination and completion are the dominant activities in this ZPD. By playing the game and by performing the storying process children will eventually come to learn the rules of discourse. I will analyse the role and function of TEO in relation to the processes of performance and completion of the utterances recorded by the children.

We can relate to ourselves and to others as in advance of our development by seeking to complete and be completed, not just to understand and be understood cognitively, not just to get it right (Newman and Holzman, 1997, Holzman, 2009). As far as the process of imitation is concerned, in the analysis of the empirical data of my thesis I will aim to clarify the role and function of TEO in this particular part of language learning in a multilingual setting.

Story as a form of performance and development inevitably confronts us with values and with our identities in germ.

4.9 Storying, values, and identities

On being born, we inscribe ourselves directly into the narrative space, the stories and the history of our sociocultural context. We treat ourselves and are treated by others as actors or characters in a story, sometimes frontline, sometimes backstage, with a past, present and future. We are encouraged to tell our story and thus establish and develop our multiple identities within the limits of narrative structures, our identities not finding their expressions in stories but truly being stories (Gergen, 1999, Cochran-Smith, 2000).
Stories, even if individually told, are products of a collective storytelling (Sfard and Prusak, 2005) as they resonate with the voices of others around us.

The dynamics of the storying process on this basis creates and re-creates the identities of the people working with TEO. In my discussion of the transcribed data I will come back to these dynamic identities as they are tentatively enacted in the discourse linking all the actors of the TEO team. A passionate debate about the name of one interlocutor’s brother ceaselessly crosses the boundaries between actual identity and designated identity (Sfard and Prusak, 2005). A perceived persistent gap between actual and designated identities, especially if it involves critical elements, tends to generate a sense of unhappiness that will be detected in the stills captures from the transcribed video sequence.

The performance of storying might have some impact on our memories and on the process of remembering. In the analysis of the empirical data I will refer to imitative and repetitive processes that are important in remembering utterances in the language production process with TEO.

4.10 Storying as a primary act of mind and its impact on memory

Storying can be described as an ideational process carried on ceaselessly by our brain or mind, although not constantly subject to reflection (Langer, 1987). Reality, fiction and myth are interwoven when we live within our stories (Cassirer, 1985). Fiction may be a necessary tool for thought and intelligence, and for considering and planning possibilities: ‘Fiction is vitally important - indeed we may live more by fiction than by fact. It is living by fiction which makes the higher organisms special’ (Gregory, 1977, p. 394). Genette (1980, p. 230) states: ‘Every day we are the subject of narrative, if not heroes of a novel’. We may use our stories for engaging relationships with other people and for constructing and negotiating our own reality and identity (Iser, 1972, Freeman, 1993). In this communicative
process we may find our own voice by confronting multiple present, past and future voices (Wertsch, 1991). Narrative then is not to be regarded as an aesthetic invention, but as a primary act of mind transferred to art from life (Hardy, 1977).

Our representations of experience are organised in our brains according to the structure and content of the discourses in which we are embedded (Harré and Gillett, 1994). Memories, just like stories, do not remain identical over time. Rather, they are subject to modifications and adaptations, to interpretations and transformations. Memories are reconstructed as new stories all the time. They are really imaginative reconstructions (Bartlett, 1995).

Processes of remembering are, most of the time, not solo acts, but are constrained by particular situations involving people that have not witnessed the original event. It is in society that people normally acquire, recall, recognise, and localise their memories (Halbwachs, 1992). It is the overall organisation of a story that persists in memory, with a constant re-working and re-constructing of the details that may, after some time, be quite remote from the original data. Details that have never existed may be added in order to maintain a certain narrative coherence. Others may be omitted altogether or be simplified or transformed. All these functions may also be used for retrofitting the past with the currently experienced lived situation (Latour, 1999).

Remembering, consciousness and storying are very closely related because ‘that what does not get structured narratively suffers loss in memory’ (Bruner, 1990, p. 56). Connecting sentences in storying is an active process of remembering (Barclay, 1973). Semantic representations for connected sentences in stories embody more information than is available from the linguistic input alone (Paris and Carter, 1973). The interpretation of stories by the members of the TEO collective may deepen the individual’s comprehension and encourage the remembering of language and story structures by grounding the knowledge in the personal and collective narratives that make up our experience and
history (Cummins, 1994). In my thesis I will trace the role and function of TEO in the processes of remembering as carried out by the TEO team.

4.11 Conclusion on the concept of storying leading up to the tool metaphor as applied to TEO

With the concept of storying my emphasis lies on ‘people telling stories to each other, as a means of giving cognitive and emotional coherence to experience, constructing and negotiating social identity’ (Bauman, 1986, p. 113). Hence, storying is valuable in giving coherence to the language learning experience in the TEO team. It keeps isolated elements of language learning episodes integrated within the frame of a general storyline. As the elements making up the story are fused with human emotions, volitions and intentions, they are leading up to the completion of the story and to the learning and remembering of language structures within the discourse of the TEO team.

Having explored the concept of storying as a leading activity in the work of the TEO team, I now want to return to the tool metaphor mentioned earlier as applied to TEO.

In Chapter Two I made reference to technological equipment such as computer hardware and software as ‘mere’ tools for allowing pupils to improve their performance and to strive for better results. It is as if these artefacts were isolated from the contextual whole, from the environing experienced world. In educational settings technology is often referred to as an extra motivational resource for getting better results or just used as a reward after the completion of standard educational tasks. Pupils are often perceived by teachers as having to be seduced or lured into the learning experience by additional resources offered through information technology. Computers are seen as supporting a
range of teaching and learning styles (Underwood and Underwood, 1999) on individual or collective planes. Technological equipment can then be characterised as a tool for result, a tool for facilitating some aspects of a task without interfering with the general task description and task procedure at large. The potential of technological tools for the transformation of the collaborative educational activities at hand (Littleton, 1999) is not always exploited in the humdrum of management questions in the classrooms.

It is important to reflect on the notion of tool in order to be able to consider the value, role and function of TEO in the language learning process as enacted by the TEO team in the transcribed empirical data to be analysed in Chapter Seven.

The notion of tool in the form of the TEO software installed on the computer hardware plays a central role in the language production process of the children under study and is of major importance in my analysis of the empirical data. The field of education is prone to ignore the central role played by material tools in the knowledge building process. In Luxembourg for instance, only one officially approved handbook that has passed the agreement procedure of the ‘Commission Grand-Ducale d'Instruction’ is approved for the teaching and learning of French in the grade where the empirical data with TEO have been collected. As a secretary of this commission at the Ministry, I have been actively involved in the approval process of each handbook through the writing of numerous appreciations. I find it particularly interesting that in educational and pedagogical research the focus will be either on the content or manufacture process of this manual or on the process of its use in the interaction between the potential participants in the learning process. The tool comes to be seen either for itself or as a simple add-on to the language learning process. The tool and the language learning process tend to be separated, especially in approaches focusing on the interaction between the human participants in the learning process. Such interactional research often depends on the recording and the analysis of the conversation and discourse actualised between the speakers. Most of the
time the tool is relegated to the background or the context of the actual learning process. How will it then be possible to foreground, or better, to recover the tool, be it a book, a pen, a computer or a piece of software, as an unflagging and persistent partner in the learning endeavour?

I need a theoretical approach that allows for the analysis of the role and the function of TEO as a real partner in the language learning process. I have identified two theoretical streams giving prominence to the notion of tool that I want to discuss in the following section: first, Activity Theory, then Actor-Network-Theory.

I argue that Actor-Network-Theory will be clearly my first choice for guiding the investigation into TEO’s roles and functions in the language learning process. I use Actor-Network-Theory because it addresses the shortcomings of Activity Theory concerning the agency and the intentionality of nonhuman actors and of technology in particular. Actor-Network-Theory can also seen as appropriate in the context of this work because it tries to avoid essentialist explanations of complex situations such as language learning. An additional advantage of this theory is that it insists on detailed description of the phenomena under observation such as to uncover the total network of people, ideas and technologies that participate in the interactions of the TEO team’s language learning. Actor-Network-Theory thus is well suited to the analysis of the constant making and re-making of languages in the code-switching or translanguaging process with TEO.

In order to legitimate my choice of Actor-Network-Theory as the theoretical framework for my thesis I now outline the historical route from Activity Theory to Actor-Network-Theory and in doing this refer to Distributed Cognition as an intermediary theory.
5 The choice of the theoretical framework: From Activity Theory to Actor-Network-Theory

Historically, Activity Theory appeared on the stage of philosophy and psychology before the emergence of the theoretical approaches of Distributed Cognition and Actor-Network-Theory. I will therefore start with a short account of Activity Theory.

5.1 Activity Theory

Activity Theory ‘weaves together (...) theoretical constructs crucial to an understanding of human activity: dynamic levels of activity, mediation, contradiction, intentionality, development, history, collaboration, functional organ, the unity of internal and external. (...) Activity theory situates itself within a humane matrix in which science is in the service of the everyday, people and things are not the same, and the activity systems of all relevant parties, not just the powerful, are important.’

Bonnie Nardi (1996, pp. 375, 376)

Activity Theory maintains that psychological phenomena and functions are formed as people engage in socially organised practical activity (‘Tätigkeit’ in German) (Ratner, 1999). It offers a framework for describing the structure and context of an activity and provides a set of perspectives linking individual and social levels. With its roots in dialectical materialism (Marx and Engels, 1968) Activity Theory has been particularly influential in the former Soviet Union where its theorising was initiated by the founders of the cultural-historical school of Russian psychology, L. S. Vygotsky, A. N. Leont’ev and A. R. Luria in the 1920s and 1930s (Engeström and Miettinen, 1999). The focus of cultural-
historical theory is on the dynamic interdependence of social and individual processes with an emphasis on development, co-construction, synthesis, knowledge transformation, and semiotic mediation (John-Steiner, 1999).

Kaptelinin (1996a) distinguishes six basic principles of Activity Theory. These can be linked to Vygotsky’s approach to learning that I had tried to implement in my classroom. I will relate each principle to aspects of language learning, as in the writer’s workshop. My personal experience will prompt a more systematic analysis of the role and function of TEO in the storying process through the empirical data in my thesis.

Kaptelinin (1996a) mentions as the first and most important principle the unity of consciousness and activity. The human mind emerges and exists as a special component of human interaction with the environment. Individual consciousness can be analysed and understood only within the context of the joint activity and within everyday practice, because you are what you do (Nardi, 1996). It is out there in the world where consciousness and hence knowledge must be acquired, because the content of individuals’ mental states is fixed by the mode of their participation in the life activity of the community (Bakhurst, 1991). In its effort to construct consciousness, Activity Theory incorporates a strong notion of intentionality as related to collaboration and development (Nardi, 1996). Schools in Luxembourg usually organise language learning activities according to a neatly sequenced step-by-step or building block model leading from the simplest to more complex competences, be it in the oral or in the written mode. Pupils’ intentionalities in relation to the subject matter taught in schools generally play a subordinate role. The logo on the front-page of the most recent documents published by the Luxembourgish Ministry of Education features the words ‘knowledge’, ‘capability’ and ‘volition’ in a neat top-down sequence as steps to be followed in acquiring competences through learning. Hence, recent moves to a competence-based curriculum simply transcribe the old curriculum into a new fashionable one with the building blocks untouched. The problem with such an
approach is that the unity of consciousness and activity is seldom attained. Vygotsky (1986) insists that the control of a function is a counterpart of one’s consciousness of this function. This is the reason why I chose the development of consciousness in the learning processes of my pupils as a main aim in my teaching effort. I tried to achieve the conscious learning of writing skills by handing over control, choice, responsibility and human intentionality to the children through the institutionalisation of the writer’s workshop. In this environment pupils can assume the responsibility for the choice of the language material and approach the finalisation of the written piece through manifold conscious decisions that have to be legitimated during the following steps: reading the piece to the class, exchanging views about its content, re-working the content individually, correcting the piece in the group and correcting it again with the teacher before it would be published under the responsibility of the child who signs as the author. This complex writing activity provokes reflective thought through its being embedded in the discourse of the socio-cultural environment. It takes up substantial time, which is crucially needed if consciousness is to be linked to language learning activities, as speed and reflective thought are antithetical at any age (Donaldson, 1980). By investing the necessary time I replaced the stimulus-response chains embedded in worksheet-based language learning episodes with Vygotsky’s proposal of meaningful activity (i.e. writing in the writer’s workshop) coming to serve as a generator of individual consciousness or co-knowledge (Robbins, 2001). Through the empirical data I will explore the role and function of TEO in the oral language learning processes that rely on the control, choice and responsibility of the children when storying. Particular attention will be given to the importance of human intentionality in the process of the construction of language learning and to the question in how far TEO can enact a kind of mediated intentionality, as it fixes the children’s intentionalities in the recordings.
Kaptelinin (1996a) points out as the second principle of Activity Theory that we live in a reality that is object-oriented, where the social and cultural properties of the environment are as objective as the physical, chemical, or biological ones. With regard to language learning, ‘object-orientedness’ means that children should learn to treat language as an object with particular socially and culturally defined properties that are also to be analysed as conventions which undergo certain changes in the development of our societies. Language is to be consciously appropriated by the pupils as an object for achieving their own functional needs. Again, the writer’s workshop served our school community well for tackling the semantic, functional, syntactic and grammatical dimensions inherent in the objectified language or ‘texts’ that were scrutinised in the writing process outlined above. I will explore in the analysis of the transcribed data how TEO comes to objectify and to materialise the ephemeral oral language produced by the children in the storying process. Objects can be indefinitely re-presented to the participants during collective social activities, thus contributing to the development of individual consciousness. TEO offers many possibilities for materialising objectifying oral language structures and hence for constituting them as learning experiences. The transcription will enable me to explore different roles and functions of the TEO tool in this important process.

The third principle of Activity Theory is that activity is hierarchically structured. Activity Theory differentiates ‘among activities, actions, and operations. The criteria for separating these processes are whether the object towards which the given process is oriented is impelling in itself or is auxiliary (this criterion differentiates between activities and actions), and whether the process is automatised (this criterion differentiates between actions and operations)’ (Kaptelinin, 1996a, pp. 108, 109). During language learning in traditional school settings, actions and operations are all too often jeopardised because the overarching activity and its object are not impelling or have lost their impelling appeal for the majority of children. Intense focus on automatising basic operations, as for instance
the learning of individual letters or the sounding of individual words, comes to subvert the children’s enormous initial motivation for learning to write or learning to speak a new language. The motivation inherent in the conscious objectives of the writer’s workshop as a total and meaningful activity contributes to the ongoing development of the constituent actions and operations at a more elementary level that should ultimately lead to the finalisation of the written products and hence contribute to the development and completion of the writing process. The storying process with its completion in the finalised story will be the focus of the analysis of the transcribed data in my thesis. Most of the conscious goal-directed actions that compose the storying activity will be described as the roles and functions of TEO in this activity. Automatised operations like the manipulation of TEO are absolutely necessary and helpful for completing the activity of storying.

The fourth principle of Activity Theory (Kaptelinin, 1996a) refers to the internalisation-externalisation process underlying the mental processes. Activities can be internal or external, but they need to be analysed in combination, if the process by which human beings acquire new abilities moves from inter-subjective cooperative mental actions to intra-subjective ones. Gal’perin (1989) demonstrated that mental actions, such as counting, memorising or categorisations of objects, originate in the material form of an action and become mental actions only after certain transformations. Hence, internalisation must not be considered as a process of copying but as a process where external interactions are transformed into reflection (Hedegaard, 2001). Conversely, mental processes become manifest in external actions performed by a person. The performance of language skills is a highly social process, be it immediate as oral language or possibly deferred as written language. The institutionalisation of language learning in schools often skips communicative and interactive opportunities that lead to the conscious individual mastery of language structures and functions. The writer’s workshop as described above set up a meaningful activity that offered multiple opportunities for inter-mental and
cooperative endeavours in the process of crafting written texts. The creation of zones of potential development among the pupils is one of the main aims when setting up these writing experiences. Through my data I will explore the existence of such zones of potential development that could be created through the ceaseless interactions between the human and nonhuman actors in the TEO team.

Kaptelinin (1996a) refers to mediation as the fifth principle of Activity Theory. Activity Theory sees human activity as mediated by external tools (like a hammer or a machine) and by internal tools (like concepts or heuristics). The cycle of tool development where material and intellectual tools intertwine in the life of each human community is an idea that was first proposed by the philosopher Spinoza (1955 (1677), p. 12): ‘But as men at first made use of the instruments supplied by nature (…). So (…) the intellect (…) makes for itself intellectual instruments, whereby it acquires strength for performing other intellectual operations, and from these operations gets again fresh instruments (…).’

Tools carry in themselves cultural knowledge and social experience and hence greatly influence the nature of mental development. As a human activity develops, tools continue to be created and transformed in the meaningful process of solving practical and intellectual problems (Cole, 1996). Tools evolve with and reflect the level of labour activity at a certain moment in the development of a culture and a society (Leont’ev, 1981, Wertsch, 1981). A very important mechanism underlying tool mediation is the formation of functional organs, where natural human abilities combine with the capacities of external components – tools – to perform a new function or to perform an existing one more efficiently (Kaptelinin, 1996a). The role of mediator can be played by psychological tools and by means of interpersonal communication (Kozulin, 1986). The technologies and tools of writing (Ong, 1982, Olsen, 1994, Eisenstein, 1979), for instance, are powerful examples of the human capacity for re-ordering and re-conceptualising the world through new modes of communication (Säljö, 1999). Thus, in language learning situations within the
writer’s workshop the computer has proved to be an efficient mediating tool for re-organising the appropriation of written but also of oral modes of language. By analysing TEO with its differentiated roles and functions in the transcribed data I will explore how the activity of storying is mediated through the software. I will discuss how TEO itself undergoes a transformation when the children put its features to an unforeseen use, as exemplified by their splitting up of utterances to be recorded.

The sixth principle of Activity Theory as identified by Kaptelinin (1996a) is the principle of development. In order to understand an activity one must trace how it developed into its existing form and thus avoid mechanistic oversimplifications. A full account of an activity should comprise its history and current practice and also reveal the developmental change of the participants. Language learning in the writer’s workshop is a complex activity that can reveal the history of a published written text and of the corresponding writing activity through the recording of multiple intermediary versions and of the collaborative processes involved in the crafting of a publishable version. Even the accompanying oral language from the discussions, reflections and evaluations around the writing and publishing process can be traced in the materialised written text. The data transcribed in my thesis will also enable me to explore how the language learning and storying activity comes to be developed or propelled through the use of TEO’s transformational potential.

Especially when confronted with complex human activities as exemplified in oral and/or written language learning experiences, it is particularly important to stress that the six principles of Activity Theory highlighted by Kaptelinin (1996a) are not isolated ideas but are closely interrelated in an integrated whole.

To sum up, Activity Theory allows us to conceptualise the TEO team of human and nonhuman actors as an integrated, functional learning unit that encompasses people, tools and the labour of storying. Adopting a functional perspective for the work and the learning
going on in the TEO team reminds me of the German sociologist Norbert Elias (1983) who in an impressive television interview stated that a meaningful action in the life of an individual must always carry with it a function for other people. Since then I have kept asking myself what this could mean for learning activities in domains such as speaking, reading or writing, using technological and psychological tools, and how these individual activities could be functional for other people and thus become significant and meaningful for the individual speaker or writer. Instances of reading and writing could be linked to the needs or activities of other people so that the use of psychological and technological tools is performed in functional unity. Adopting this functional stance legitimates the TEO team as the basic unit for oral language learning and helps to outgrow the individualistic paradigm so prominent when it comes to language learning situations in the official school setting where it is the individual who must account for his or her learning process. Reading might be better learned when being performed for people needing or preferring to be read to. The development of all participants relies on their participation in such integral purposive activities. Writing exchanges could be set up similarly, also serving communicative, discursive and practical functions, such as establishing or using older people’s shopping lists and even doing their shopping which would in addition allow arithmetic and computational skills to be practised in a functional unit.

Using Activity Theory for the analysis of the language learning processes within the TEO team is nevertheless a difficult task because Activity Theory was mainly developed as a psychological theory of individual activity (Kaptelinin, 1996). In order to overcome such limitations a systemic model, based on the conceptualisation of Engeström (1987), has to be adopted in order to explain collective activities and cooperative work. The initial theory is thus reconfigured through the addition of rules, community and the division of labour into an activity system. The reconfiguration is often referred to as ‘second generation Activity Theory’, which highlights the importance of collective rather than
individual activity. An activity system is then a way of visualising the total configuration of an activity as in Figure 2 (Engeström, 1987, p. 78):

Transforming the object into an outcome motivates the existence of an activity. Applied to the work with TEO, the transformation of language structures and elements into a story motivates the existence of the language learning activity. In Engeström’s model of an activity system, the subject refers to the individual or group such as the TEO team whose point of view is taken in the analysis of the activity. The object (or objective) is the target of the activity within the system. Instruments refer to internal or external mediating artefacts or signs such as TEO or the practice of storying that help to achieve the outcomes of the activity such as the finished story. For Engeström (1987) a community comprises one or more people who share the same object with the subject. The relationship between subject and community is mediated by rules. Rules cover and regulate both explicit and implicit norms, conventions, and social relations within a community. The relationship between the community and the object is mediated through the division of labour. The division of labour refers to the explicit and implicit organisation of a community as related
to the transformation process of the object into outcome. Division of labour discusses how
tasks are divided horizontally between community members as well as referring to any
vertical division of power and status.

Between the components of an activity system, continuous construction is going on.
The human beings not only use instruments, but they also continuously renew and
develop them, whether consciously or not. They not only obey rules, they also mould and
reformulate them and so on. Hence, the components of activity systems are not static
components that exist in isolation from each other, but they are dynamic and continuously
interact with the other components through which they define the activity system as a
whole. From an activity theoretical perspective an examination of a phenomenon (learning
in the classroom, for instance) must consider the dynamics governing the combination of
the components. Hence, the intentions of a particular person, for instance the teacher, with
regard to the role and function of a tool like TEO in the language learning process might
come to be irrelevant when the pupils perform their team effort with TEO. The dynamics
originating in the team learning experience might depend on the particular properties and
affordances of the tool, which I will uncover in the analysis of my empirical data. The
instantiation of TEO’s properties and affordances might not be predictable at the onset of
the team’s activities as launched by the teacher within his/her curricular framework. It is
essential to realise that an activity system is not a homogeneous entity, but is composed
of a multitude of disparate elements, voices, and viewpoints (Engeström, 1996).
Contradictions lie at the heart of the relationships between the different constituents of an
activity system. Hegel (1963, p. 59) signals the importance of contradictions in the
development of human institutions and activities: ‘Something is only alive to the extent that
it contains a contradiction within itself, and, indeed, this is the power to grasp the
contradiction in oneself and endure it.’
Thus, **contradictions** and/or **ambiguities** are inherent to any human meaning making, to knowledge building and to learning activities. Contradictions and/or ambiguities can be a source of development of our mind and of our relationships. Ilyenkov has pointed out that our views, concepts and theories emerge as temporary solutions to the contradictions and ambiguities that characterise our experience of reality and will suffer contradictions themselves later (Bakhurst, 1991).

Teachers often do not see their role in planning activities and settings for making contradictions the propeller of personal and professional development by giving access to new levels of consciousness and control. Creating settings that foster unexpected developments transfer responsibilities and activities from the teacher to the students and to the tools. In delineating a frame for the work with TEO I want to quote Bateson (1994, pp. 9, 11) who maintains that ‘most of learning occurs outside the settings labeled as educational. Living and learning are everywhere founded on an improvisational base. (...) Ambiguity is the warp of life, not something to be eliminated.’

Teachers in official educational settings experience problems when it comes to accounting for contradictions, ambiguities and uncertainties in the developing learning process. This may explain the dearth of research based on activity theoretical concepts in the domain of learning within the curriculum of primary schools where the basics of literacy are taught in Western societies.

### 5.2 Activity Theoretical research in educational settings

Activity Theory can provide some important insights into the meaning of curricular educational activities and learning at the level of primary schools, especially when they are supported through electronic tools and computers. Generally most of the research has focused on the curricular domains of elementary mathematics (Davydov, 1975, Newman et al., 1989, Damazio, 2001), science education (Giest, 1994, 1991, 1996), biology
(Hedegaard, 1996), history and geography (Hedegaard, 1999, Hedegaard and Sigersted, 1992). Other studies have concentrated on the learning activities of primary school children outside school in after school settings such as the ‘Fifth Dimension’ in San Francisco (USA) (Cole and Nicolopoulou, 1993, Cole, 1999, Brown and Cole, 2002) or ‘The Young Scientist Club’ in East Harlem (USA) (Hedegaard et al., 2001). However, it is hard to find substantial research in the curricular domains of oral or written first or second language learning that explicitly refers to activity theoretical concepts. Projects that diffusely or selectively if not idiosyncratically or arbitrarily refer to some of the elements of Activity Theory mentioned above abound.

It is only in combination with electronic tools that activity theoretical concepts have been applied to so called computer-supported collaborative learning. Obviously the tool metaphor prevalent in Activity Theory acts as a strong incentive for using its concepts in studies that involve the use of computers in a community of learners. With its focus on the mediation of activity through tools, Activity Theory can help to describe learning and teaching events when a community changes practice over a significant period of time. Activity Theory can be a useful method for research as it acknowledges the importance of context, perceptions, emotions and contradictions in technology-based learning and working situations (Issroff and Scanlon, 2001). Again, the emphasis of the studies is with students in higher education and in science, especially when mobile technologies (Scanlon et al., 2005) or interactive whiteboards (Zevenbergen and Lerman, 2007) come into play. Some research in language learning (second language learning, learning to write in a second language) relying on activity theoretical concepts is also related to older students (Lantolf and Pavlenko, 1995, 2001, Lantolf and Genung, 2002, Lantolf and Thorne, 2006, Nelson and Mi-Kyung, 2001, Russell, 1995). I will discuss those activity theoretical studies that research computer-supported learning with children in the preschool and primary years.
From very early on in educational research Activity Theory has considered the one-child one-computer ratio as undesirable. Work with peers or teachers together at the computer has been favoured (Cole et al., 1987, Griffin et al., 1992). This led to an early recognition that the computer as a tool or medium can redefine and enhance communication between adults and children. In a similar vein, I had discovered in my writer’s workshop that writing texts on the computer led to a large amount of communication on and around the task whenever children were allowed to work on their own in a room next to our classroom (Gretsch, 1992). There was right from the beginning an interest in the authoring components of the use of software and computers with early years’ children (Griffin et al., 1993). However, this position quickly gave way to studies of the implementation of traditional skills and drill based software, a trend probably due to a rapid development of the surface features of educational software enhanced by more and more sophisticated images, movies and sounds.

Looking for reasons why activity theoretical approaches involving ICT tools have not been fertile in educational reform, Hatano (1993) denounces the narrow interpretation of Vygotsky’s main concepts in the terms of empiricism and of Piaget’s individualistic constructivism that continue to dominate American education and educational research in general. Hence, even proponents of Vygotsky’s views fail to propose alternatives to the conventional educational practice that remains close to the transmission of ready-made knowledge from outside to the individual mind. Ironically, Hatano (1993, pp. 161, 162) himself fails to acknowledge the contributing, constituting or formative role of the non-human actor, i.e. the computer with its software, as he bluntly states that ‘because the software is static, it does not seem to contribute greatly to the constitution of context.’ He also considers artefacts and tools as constraining live participants’ actions and constructions, as representing the voices of people that have power and hence are to be resisted.
The linguistic turn in cognitive psychology as exemplified by Bruner’s (1987) adoption of Vygotsky’s theoretical approach on language and consciousness may also have provoked the reduction of the scope of studies within the paradigm of Activity Theory. Through the emphasis on the meditational role of language there is definitely a theoretical bias towards the primacy of the representation over what is represented, i.e. the social reality (Graumann, 1988). Such a view leads to a reduction of the social and to a mere normative regulation of individual behaviour through a sequence of information schemes and mechanisms (Papadopoulos, 1996). In the end – Graumann (1988) bitterly remarks - a cognitivist, hence also a Vygotskian, might be further away from social reality and the humdrum of social activity than a hardnosed disciple of Skinnerian behaviourism. Many educational studies based on Vygotsky’s ideas and on the activity theoretical approach simply fail to address the fullness of social and historical conditions and dimensions that constrain the educational efforts of intentional, active, dynamic and changing human beings.

My account of Activity Theory shows that there has been a substantial development of the theory over the last decades in order to account for the messiness and irregularities of everyday human behaviour organised in particular activity systems. However, some parts of the theory do not allow for emphasising the role and function of tools and objects in the launching and continuation of human activities as well as in the constitution and maintenance of the TEO language production team: ‘Examining what a theory leaves out may be just as important as understanding what it brings in’ (Kaptelinin and Nardi, 2006, p. 226). I will discuss the issue of the relevance of tools within Activity Theory below.

**5.3 Discussing the relevance of tools within Activity Theory**

I will now point to some difficulties that I experience with Activity Theory when it comes to accounting for the importance of a tool like TEO in the language learning process of the
TEO team. At first sight, Activity Theory seems to be very explicit about the role and function of tools in human developmental and learning processes, but closer analysis reveals potential difficulties when we study real language learning processes in a school setting where the TEO tool is used. The question of ‘how entities [in our case the TEO production team involving human and nonhuman actors] are configured as human and nonhuman prior to our analyses’ (Casper, 1994, p. 4) has to be addressed through ‘empirical investigations of the concrete practices through which categories of human and nonhuman are mobilized and become salient within particular fields of action’ (Suchman, 2007, p. 1). This is all the more important when human and nonhuman actors intertwine as intimately as in the configuration of the TEO software where human activities, i.e. human utterances, are encapsulated and preserved within a nonhuman architecture, i.e. the TEO software and hardware. In the case of the work with TEO it is especially important to address the question of how and when the categories of human and nonhuman or machine become relevant (Suchman, 2007) in the language production process. In particular, the notion of agency needs to be expanded beyond the view of an individual and autonomous agent endowed with free will and independent thinking to a larger entity or community working within particular social formations with material and symbolic tools. I will deal with the question of agency as an individual or social-collective property. I will also address the question of action and agency as applying also to nonhumans and machines (Ahearn, 2001). In Latour’s (1999, p. 182) words: ‘Action is a property of associated entities. (…) The attribution to one actor of the role of prime mover in no way weakens the necessity of a composition of forces to explain the action. (…) Action is simply not a property of humans but of an association of actants.’

My emphasis on agency in language learning as a feature of the TEO team’s community of practice and association of human and nonhuman actors, however, does not prevent me from being aware that ‘ineffective learning is also socially embedded. It is not
embedding that makes learning effective; it is the quality of the social framework and the
activity carried out within that framework that determine learning outcomes’ (Lantolf and
Genung, 2002, p. 176). I will explore how the TEO team could profit from the storying
activity for language learning to occur, in particular by exploiting the overlapping agencies.

Part of the difficulty with Activity Theory rests in the danger of nominalism or
essentialism inherent in some of the terms used in the diagrams and descriptions above.
Categorical debate tends to take precedence over empirical investigation. Terms such as
‘subject’, ‘artefact or tool’, ‘object’ or ‘outcome’ can become theoretical constructs that are
prone to the danger of mingling several analytical layers. The relationship between the
different elements of an activity system delineated above appears to be of a linear kind
despite the caveat of the proponents of the theory that we must consider contradictions
and detours. I will be more concrete by using the example from the TEO team producing
and learning language with the TEO software.

Let us begin with the ‘subject’ of the activity. Of course, second generation Activity
Theory allows for posing the group or TEO team as the subject of the activity. However, in
the traditional classroom activity system the subject of the oral language learning activity is
the individual pupil organised in a community of clearly separated individuals. Each
individual has to assimilate the linguistic material as it is defined in the curriculum and
presented by the teacher through planned lessons. In general, it is the individual
achievement of the pupil that will be measured against the performances of all other pupils
involved. Testing and assessing the individual is entrenched in the culture of Western
European classrooms and educational systems where promotion is tied to the certification
of individual competences. Collective performances resulting in collective competences
are mostly not considered to belong within the scope of individual assessment procedures.
Theoretically, Activity Theory establishes the primacy of activity over the subject and the
object (Kaptelinin and Nardi, 2006) and maintains that no properties of the subject and the
object exist before and beyond activities (Leont’ev, 1978). Graphically and practically however, Activity Theory also appears to stress the importance of the individual as it separates the subject from the object and gives the illusion that the authority during the activity lies with the subject alone: ‘In activity theory, any activity is an activity of a subject. (...) Therefore, interaction between the subject and the object (...) is not a symmetrical relationship between two components of a larger-scale system. The interaction is initiated and carried out by the subject to fulfil its needs’ (Kaptelinin and Nardi, 2006, p. 32). Hence, Activity Theory fails to alert us to the collective nature of language production. It also gives the impression of a direct link between the subject and his/her object of activity, their separation being abolished only in Engeström’s expanded model. It looks as if all the responsibility and accountability for successful language production lies with the individual speaker or writer. This makes it difficult to account for distractions and interruptions (caused by objects or events outside the direct relationship between subject and object) so prominent with team efforts for accomplishing the necessary coordination during language processing in authentic communication and interaction. In short, Activity Theory gives the impression of a hierarchical organisation of human activity, clearly privileging the subjective over the inter-subjective organisation of language production. Collective team performance and practice are considered an add-on activity.

Activity Theory also presents goal-directed activity as the motor of development. This suggests that the goal of an activity, in our case the content of the language production process, must be defined right from the beginning of the activity. Such a view would prevent us from seeing goals as continuing to be elaborated on through interaction after the onset of activity. Activity Theory risks getting assimilated to a psychological theory of individual activity (Kaptelinin, 1996). Hegel once remarked that an individual cannot define the goal of his action until he has acted (Leont’ev, 1981a). This means that the goal of an action can only be tested through the action itself. Very often goals appear to be
determined only in retrospect, a fact that underscores the importance of discourse, semiotic mediation and transformation processes in the knowledge building procedures (Wells, 1999).

In order to illustrate such a complex process I have extracted an example from the body of transcription of my thesis where three children of 8 years of age (V, F, A) are about to record the utterance ‘My sister is called Tessy’. LUX designates the Luxembourgeois language and FRENCH the French language:

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>TEO</td>
<td>128.44s</td>
<td>130.56s</td>
<td>Ta soeur.</td>
</tr>
<tr>
<td>60</td>
<td>V</td>
<td>130.13s</td>
<td>132.66s</td>
<td>As got f...? ... richteg?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[is that wr...? ... correct? LUX]</td>
</tr>
<tr>
<td>61</td>
<td>F</td>
<td>131.91s</td>
<td>134.29s</td>
<td>Jo ... e bessen. Jo!</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Yes ... a little bit. Yes! LUX]</td>
</tr>
<tr>
<td>62</td>
<td>A</td>
<td>134.25s</td>
<td>135.47s</td>
<td>Jo</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Yes. LUX]</td>
</tr>
<tr>
<td>63</td>
<td>V</td>
<td>137.63s</td>
<td>145.76s</td>
<td>Speedy Gonzales heescht on. Eh. Ah jo, mam Fanger drop.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Speedy Gonzales is his name. Eh. Ah yes, with the finger on it. LUX]</td>
</tr>
<tr>
<td>64</td>
<td>A</td>
<td>147.31s</td>
<td>151.60s</td>
<td>(Laughing) An elo hm ech.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[And now hm it is my turn. LUX]</td>
</tr>
<tr>
<td>65</td>
<td>F</td>
<td>151.08s</td>
<td>153.52s</td>
<td>Ma soeur s’appelle ...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called ... FRENCH]</td>
</tr>
<tr>
<td>66</td>
<td>A</td>
<td>153.29s</td>
<td>156.54s</td>
<td>Ma soeur s’aappelle Tessy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called Tessy. FRENCH]</td>
</tr>
</tbody>
</table>

The situation starts off in Turn 59 with a replay by TEO of a part of a sentence recorded as an utterance by V. Overlapping with the TEO replay V then asks the expert F in Turn 60 for an evaluation of her contribution to the ongoing discourse aimed at finding out the name of A’s sister. The goals of the language production process seem to relate at the same time to the correctness of the discourse pattern and to the correct pronunciation of ‘Ta soeur’. It is not quite clear what exactly the direction of the language production process will be, a situation that might be reflected in F’s tentative turn in 61: ‘Jo ... e bessen. Jo! [Yes ... a little bit. Yes! LUX]’. However, in Turn 62, A puts the language production process back on track by confirming the correctness of V’s utterance.
Nevertheless, the direct continuation of the ongoing discourse is immediately interrupted for about twelve seconds by V’s intense search for an icon fitting her recording. The language production process resumes in Turn 64 when A laughingly re-negotiates her part in the discourse by claiming the floor: ‘An elo hm ech. [And now hm it is my turn. LUX]’, a claim that is supported by F in Turn 65 when he provides the correct template in French, which has just to be completed with the correct name by A in Turn 66. The foundations for language learning in French have been re-established in the face of distractions and contradictory discourse in Luxembourgish.

In the TEO situation above it is the local interactions with the environment that provide the foundations of actions and not plans in themselves, even if there might be references to abstract representations of situations and of actions (Suchman, 2007). Suchman (2007) also points out that the social and technical means by which local and messy knowledge and practices are made robust, coherent, and mobile are talk, tradition and templates. In our case, the technological device offered by TEO enables even ephemeral language productions to be stored and allows for the maintenance of the discourse around the production. Hence, motives and goals should be considered as establishing themselves in the process of practical language production and with the help of the TEO tool. The considerable role played by this socially shared artefact in the language production process, especially when providing a focus to negotiations between the human actors, needs to be explored.

Activity Theory may not be the best analytical tool for making visible the connections between human and nonhuman members of the language production unit as it imposes an undue asymmetry on the different elements under consideration. Not only is there a separation between subject and object of the activity where the object is often blurred, but there also tends to be a subordination of the tools to the intentionality of the subject
conducting the activity. The role and the function of the tool and of the tool-mediated activity are in danger of being underexposed. This is all the more the case when the subject of the activity is a group or a team engaged in discourse that structures the goal and the performance of the language production activity, as in my example above. The complementary elements of the TEO activity, i.e. a group of pupils constructing a story in the presence of nonhuman hard- and software, need to be fused into one unit of analysis in order to understand the language production process as well as the role and function of the tool and of the tool-mediated activity.

For a more fine-grained analysis of the TEO activity with an emphasis on the role and the function of TEO I have decided to adopt the theoretical concepts of Actor-Network-Theory. Actor-Network-Theory counters the following shortcomings of Activity Theory:

First, the individualism lurking in Activity Theory must be overcome in favour of the common endeavour and collective activity of a group that performs the language production and learning with TEO.

Second, the subject-object dichotomy that remains at the heart of Activity Theory must be overcome in order for objects to become more visible in the collective activity. That means that in our case the visibility, role and function of TEO must become established.

Third, a place for objects and nonhuman actors must be made that overcomes the asymmetry of Activity Theory’s account of agency, mastery and intentionality as belonging entirely to the realm of the human actors. In our case, the agency of TEO in the collective activity must become visible.

Fourth, the collective activity, in our case the language production and learning in the TEO team, must be traceable through its inscription in the network of the human and nonhuman actors.
Having opted for Actor-Network-Theory as a theoretical tool that counterbalances the shortcomings of Activity-Theory, I will use its concepts for the analysis of the role and function of TEO in the TEO team. I will first introduce Actor-Network-Theory and then discuss the four points above within its context.

5.4 Actor-Network-Theory

Actor-Network-Theory originated in the field of science studies in the wake of the theory of Distributed Cognition that Latour (1989), one of the founders of Actor-Network-Theory, considers as a ‘comrade’ and ancestor. Distributed Cognition shows a concern for co-ordination between individuals and artefacts especially where technology is deployed in complex settings (Daniels, 2008a). It emphasises the social aspects of cognition and unites individuals, artefacts and the environment in a framework that constitutes human knowledge and understanding (Hutchins, 1996). Within situational affordances and interdependencies (Salomon, 1993a) people construct knowledge through information processed between individuals and cultural tools in order to achieve shared objectives in cultural surroundings (Salomon, 1993). The emphasis is then on the analysis of an activity distributed among a group of people within a certain context where a set of concurrent socio-computational dependencies shape the pattern of behaviour of the group (Hutchins, 1996).

Considering that materials and the rest of culture are intimately entwined (Hall, 1973), Latour (1999) and Actor-Network-Theory extend Distributed Cognition by giving prominence to sociotechnical negotiations and artefacts whose role must be traced in the network of human endeavours. Human and nonhuman actors constitute a collective of actants that unites individuals, objects and representations into a collective ‘we’. The Italian writer Italo Calvino (2009, p. 124) insists that we must transcend the limited perspective of the individual ego and ‘give speech to that which has no language, to the
bird perching on the edge of the gutter, to the tree in spring and the tree in fall, to stone, to cement, to plastic …’. Human activities can then be traced as a combination of experiences, information, books we have read, things imagined. Each life is an encyclopedia, a library, an inventory of objects, a series of styles where everything can be constantly shuffled and reordered in every way conceivable.

The discussion of the shortcomings that I identified in relation to Activity Theory will clarify my choice of Actor-Network-Theory for analysing the role and function of TEO.

5.4.1 Individual versus collective activity

Nardi (1996a) stresses that Distributed Cognition, despite adopting as its unit of analysis a cognitive system composed of individuals and of the artefacts they use, seeks to understand how individual agents align and share within a distributed process during a common activity. Thus, the emphasis remains at the level of individual cognitive functioning, a level not appropriate for explaining the performance of the TEO team. For Actor-Network-Theory an entity or a team like TEO gains in reality if it is associated with many associates (human and nonhuman) that are viewed as collaborating with it (Latour, 1999).

The individual members of the TEO team are dependent on each other for achieving the performance of the activity. They will have to coordinate their actions among the persons and the devices involved. Much of the organisation of behaviour is removed from the human performers and given over to the structure of the object or system with which they must coordinate (Hutchins, 1996). The structure of the TEO tool and the encapsulated function of storying can hence be accounted for in the analysis of the TEO team’s language learning activity. Actor-Network-Theory insists on the redistribution of activity and of historicity among all the actants involved (Latour, 1999). As a consequence, the competences acquired in the course of the language learning in the TEO team cannot be
entirely predefined, because actants gain in their definitions through the very trials of the TEO event (Latour, 1999).

People must engage in the social organisation of their activity in order to make the coordination successful. Of course, the group effort is not devoid of problems and potential disruptions. Contradictions and misunderstandings, as outlined in my account of Activity Theory, loom large when the responsibility for the task is distributed among the members of a team. But the potential for resolving problems that may be encountered in the task can outgrow the possibilities of an individual cognitive activity, because Distributed Cognition and Actor-Network-Theory consider ‘the team as a sort of flexible organic tissue that keeps the information moving across the tools of the task. When one part of this tissue is unable to move the required information, another part is recruited to do it’ (Hutchins, 1996, p. 224). People and tools are equivalent ‘media’ in a distributed cognitive system. Hence, the importance of the tool in the TEO language learning team is stressed and a step to overcome the subject-object dichotomy in Activity Theory is being made.

5.4.2 Subject-object dichotomy versus importance of the object or tool

For proponents of Distributed Cognition the coordination through discourse or bodily adjustments among team members is essential in ensuring that a task can be accomplished within the environment replete with tools. Hutchins’ view of the team as an organic tissue that keeps the information circulating across the tools puts the construction of social relationships at the core of the TEO team’s language learning. Members of the TEO team are complementary in the fulfilling of the language learning activity. Different members of a group have different perspectives, skills and responsibilities. No individual member has access to all the information or skills in the system. Thus, the cognitive properties of the group are not predictable from the knowledge of the properties of the individuals in the
group. Cognitive abilities of an individual can only be a part of the dynamic event in which the knowledge building occurs through relations (Hutchins, 1996).

But are we not in danger of rebuilding the old subject-object dichotomy by just replacing the individual subject with a collective subject whose cognitive abilities we set out to study, while forgetting the objects or tools in the process? If we focus exclusively on the activity of the individual or collective subject in the language production process, we risk losing our hold on the role and function of the TEO tool, because in a dichotomous view, subject and object cannot share history equally, human subjects being mobile and transformative while nonhuman objects remain immobile and fixed (Latour, 1999). Applying the subject-object dichotomy to the analysis of the TEO team’s language learning would prevent uncovering the varying roles and functions of TEO.

Even Hutchins’ insistence on the socio-material environment and on the flexible reorganisation of functional systems keeps up a separation between the human and nonhuman elements of a production unit. It looks as if the production team was composed only of human actors whose discourse is leading the activity. In this case, agency is not equally distributed between human and nonhuman actors as they appear to occupy different levels in the hierarchy of the activity and tend to be separated through their differential status in the activity.

Latour (1999, p. 190) however does not tire of alerting us to the factual result of human history and evolution: ‘Humans are no longer by themselves. (...) other actants (...) now share our human existence (...).’ Actor-Network-Theory does not intend to extend subjectivity to things, to treat humans like objects or to take machines for social actors, but tries to avoid using the subject-object distinction at all in order to capture the moves by which any given collective extends its social fabric to other entities (Latour, 1999). Actor-Network-Theory will then help trace and identify the roles and functions of TEO in the interplay of the human and nonhuman actors performing in the TEO team. Knowledge
building through the performing of a task is distributed amongst all participants, the mediating artefacts, the discourse between the participants and the situation knitting together the human and nonhuman elements.

Despite some critical remarks, I wish to give credit to Hutchins (1996), for whom learning is always an adaptive reorganisation in a complex system and who is constantly looking for processes of coordination and resonance among elements of a system that includes a person and the person’s surroundings. Transcending Hutchins’ notions, Latour (1999) proposes that objectivity and subjectivity are not opposed but irreversibly grow together. Tools and artefacts are fully-fledged social actors in that they do not merely mediate our actions, but they are us. The definition of a tool as an extension of social skills to nonhumans inevitably leads to a re-articulation of the notions of agency, mastery and intentionality in the performance of the TEO team. Latour’s redefinition overcomes Activity Theory’s asymmetrical account of agency, which remains with the subject of the activity, i.e. the human actors, be it an individual or a group as in the case of the TEO team.

5.4.3 Overcoming the asymmetry of Activity Theory’s account of agency, mastery and intentionality

Although they characterise agency as a fundamental attribute of both the subject and the object mutually influencing each other, proponents of Activity Theory often accord a special status to the subject of activity when it comes to the ability and need to act. In their interpretation, nonliving things lack the need and hence the ability to act (Kaptelinin and Nardi, 2006). They ascribe the quality of intentionality solely to human agents immersed in a certain activity, thus establishing an asymmetry of people and things. They maintain that technologies are both designed and used by people as they complete their intentions as subjects in the world (Kaptelinin and Nardi, 2006). However, it is established that - at least
for young children - many dynamic actions take place with and around objects or tools in
the absence of a marked intentionality (Moro and Rodriguez, 2005).

It might be possible to view agency and intentionality as distributed more evenly
among human and nonhuman actors in the language production process with TEO. If
responsibility for action is shared among the various actants in a collective, then the
question of mastery dissolves and it becomes impossible to speak of any sort of mastery
in our relations with nonhumans, including their supposed mastery over us (Latour, 1999).

According to Actor-Network-Theory intentionality and agency are not properties of
human or nonhuman actors but of the TEO situation, i.e. of institutions and of what
Foucault called dispositifs (Latour, 1999). Without negating differences between humans
and machines, intentionality needs to be understood not as located within the individual
mind but as a field of socially and materially mediated relations within which persons act
(Suchman, 2007). Cognitive abilities taken to be inherent in people then can be shifted to
or be realised through material objects. In the case of language learning with TEO, human
agency and intentionality is captured and recorded with the technological tool and can be
mobilised later in the process. Through this materialisation of the language, a latent
intentionality or agency lingers in TEO. TEO is then an artefact embodying ‘inferred’,
‘referred’, ‘derived’ or ‘stored’ intentionality (Stahl, 2006).

The nature of this form of agency and intentionality needs to be addressed through a
methodological approach that can capture its presence and enactment. The ‘mere tools’
approach to the role of technology in collaborative language learning must be overcome.
In a technological setting, subject, object, activity, motive, and so on cannot exist and
cannot be analysed apart from the machines as these are not external to what is going on:
‘These mere "things" have to be incorporated into the story, and when they are the story
takes on a heteroclitic form - human agents and nonhuman ones bound together in
interpretivist narratives’ (Geertz, 2000, p. 154). All these discrete items make up a
collective like the TEO team. They must be connected and become traceable through their inscription in a network of collective performance.

5.4.4 Tracing TEO with Actor-Network-Theory

Actor-Network-Theory describes environments and collective situations in technology-driven activities as networks of human and nonhuman actors. It traces the ever shifting associations and connections between the human and nonhuman members of the production team, thus considering and respecting the mediating role of all the actors in the particular activity (Latour, 1999). We can then investigate the group’s continuous re-arranging through discourse in the language production process with TEO after having let the actors deploy the full range of controversies in which they are immersed (Latour, 2005). Latour (2005) defines an actor in the hyphenated expression Actor-Network not as the source of an action but as the moving target of a vast array of entities swarming towards it. Action then is dislocated, borrowed, distributed, suggested, influenced, dominated, betrayed and translated. Action with TEO can result in knowledge of language that results from the simultaneous presence of the most disparate elements that converge to determine every event (Calvino, 2009). Actor-Network-Theory insists that there is no orderliness in the concreteness of everyday life (Garfinkel, 2002) and hence is in line with the concreteness of educational activities.

I will attempt to trace the connections in the network between the different human and nonhuman actors in order to show the working mechanism of the TEO team and how it is held together or falls apart. Multiple ramifications are possible in the network where interchangeable human and nonhuman actors, people and things meet and co-exist on an equal level. The equality of things, objects and persons in human activities does not preclude differences among them. It is precisely the place and status that Actor-Network-Theory affords for the concept of difference that makes this approach so valuable in
educational work with TEO. Tarde’s concept of difference must prevail in the analysis of
the constitution and the production process of the TEO team. Tarde (1895/1999) insists
that existence is substantially difference and that one must start from this difference and
abstain from trying to explain it, especially by starting with identity. Difference goes with
uncertainty, ambiguity and unpredictability, all important elements that are constitutive of
the very act of building something on the fly or of setting a lively historicity into motion
(Latour, 1999). The resilience of such uncertain, ambiguous, unpredictable and lively
language production and learning processes with TEO will be analysed in my thesis by
following the practice of the human and nonhuman actors.

In order to trace the language production process by the TEO team, we must follow
and describe the human and nonhuman actors when they circulate through the network of
their associations where they are not substitutable and must make a difference. Causality
then follows the events and does not precede them (Latour, 1999). Tracing establishes a
network of relationships so that the analyst can follow the actors, multiplying the details so
that his/her descriptions and digressions become infinite (Calvino, 2009). We move away
from a human actor fully in command of a certain activity or performance. Agency and
control shift from the all powerful master to the many ‘things’, ‘agents’, ‘actants’ with which
he/she has to share the action. Agency then becomes a manifestation of circulating actors
and is redistributed between humans and nonhumans. Consequently, the unit of analysis
of the team language production process with TEO extends beyond the skin and the skull
of the individual human actors. The unit of analysis now includes the socio-material
environment of the persons involved. Tools and artefacts are no longer considered as
‘standing between’ the subject and the object of an activity. Actor-Network-Theory
considers a tool like TEO as much more than one of many structural elements or
intermediary objects that are brought into coordination in the performance of the activity
(Hutchins, 1996). TEO is an unpredictable mediator and foremost means and ends at the
same time. I will pursue this point in the analysis of the transcribed data under the metaphor of ‘tool-and-result’.

Mediators like TEO constantly remake and endlessly transform social relations uniting humans and nonhumans through fresh and unexpected sources of action (Latour, 1999). In the team language production process with TEO there is a fusion of mediating structures – such as the hard- and software, the concept of storying, the group discourse – that all participate in the organisation of the performance in a network connecting human and nonhuman actors (Latour, 2005). The analysis can then focus on the unfolding of the team activity in a real educational setting within the improvisatory, uncertain and unpredictable nature of human activity (Lave, 1988, Nardi, 1996a). The sets of social practices with and around the team member TEO as one of many mediators are then of particular interest to me (Hine, 2000).

Hence, I need to choose a methodology of description and transcription that provides access to the group effort in the language production process with TEO and that allows for a thorough analysis of the TEO team’s discourse, cognition and intentional states (Stahl, 2006). I will follow the voices of each actor in the description and transcription without assuming that there are direct, vector-like causal relations between the different actors. This will obviously prevent me from always designating a particular actor as a source of initiative or a starting point (Latour, 2005).
6 The Methodology of Description and Transcription

Through the transcription I will unveil the context of the activity of oral language production involving human and nonhuman actors. The transcription follows the activity by means of detailed description. My aim is to make visible the different layers of the dynamic process of oral language production involving multiple voices of unity and discord, imperfectly sharing their knowledge; but remaining creative in the face of changing circumstances (Moll, 2000). In the work with TEO the oral language production is situated temporarily in a setting where people interact with tools intentionally designed by other people for the purpose of enhancing communicative behaviour. The social is thus present in things as well as in the people making use of these tools and symbols. The language is produced in a world full of material and symbolic objects (signs, knowledge systems) that are culturally constructed, historical in origin and social in content (Scribner, 1990). It is this network or association of human and nonhuman actors engaged in the process of meaning making that has to be accurately described and analysed in full detail (Toulmin, 1999). A transcription of the recording of ‘La Famille’ - a story about the families of two of the participant children - is the focus of my description and of my analysis.

6.1 The institutional and classroom context of the activity of storying with TEO

The transcription below is only a small portion of data recorded in spring 1994 in the institutional setting of a second grade classroom of a state primary school in a Luxembourgish local community of about 3,000 inhabitants. The teacher of this particular class of eight-year-old children had decided to participate in the original TEO project in order to conceptualise the first TEO software and to implement the pedagogical approach of storying with TEO in the learning of oral French as called for by the Luxembourgish
The material presented can be characterised as a routine institutionalised school activity (Cicourel, 1992), at least for the classroom participating in the TEO project. All of the children of this class used TEO for their learning of oral French as scheduled in the official syllabus, although they were given the option of continuing in the traditional way. The activity occurred in a special room equipped with computers, scanners and other electronic material at the disposal of all of the classes in this school. The computer room was situated on the same floor as the regular classroom of the pupils involved but was not adjacent to it. The teacher’s local control of this routine activity can be virtually excluded as he stayed for most of the time in the main classroom, even if it was possible for him to pop into the computer room at any moment. The teacher had deliberately chosen TEO in order to give pupils the possibility to explore on their own the oral dimension of French, which was allocated four hours per week in the curriculum. Coming from a family background of Italian immigration, this teacher was aware of the educational importance of talk of an ‘exploratory’ kind (Britton, 1970, Barnes, 1976, Barnes and Todd, 1978, Norman, 1992) for exploiting the potential richness of the multilingual curriculum and for appropriating the oral and written dimensions of the languages in the Luxembourghish school. In articles published in a journal on his work with information technology (Fiermonte, 1994, 1996) this teacher referred to the difficult role of guiding students into explicitly rational discussions (Mercer and Wegerif, 1999). He knew that the very presence of the teacher alters the way in which pupils use language, prompting them to aim at ‘answers’ which will gain approval rather than use language to reshape knowledge (Barnes, 1976). During the initial TEO project in 1993-1994, this teacher agreed to take notes concerning the regular activities of the children during the learning episodes around TEO, to discuss his views on the pupils’ French oral learning processes and to publish his evaluations in a final report (Gretsch, 1994). Beside the written notes the teacher also agreed to intensive audio and video recordings of the learning sequences.
with TEO, which have been widely used in teacher training, in in-service training and in sessions with parental associations. Some recordings have also been incorporated into the video documentation of TEO (MENFP, 1994) and into a CD-ROM (MENFP/SCRIPT, 1998) that presents the key theoretical concepts of the TEO project.

While working with TEO, the pupils from this classroom were accustomed to being observed and recorded either on videotape (about half a dozen times) and on audiotape (regularly) during half a school year. The children were used to the presence or the intrusion of other students, staff or visitors during the recording sessions. It may be inferred that the temporary presence of an adult video operator who did not belong to the school staff did not have too much of an impact on the performing of the task. The technician does not participate in the joint transactional segment the pupils have established, i.e. a segment of space that two or more persons take up in virtue of the line of activity they are pursuing (Kendon, 1992).

I will first describe the human actors seen on the still picture in Plate 3. It is taken from the video recording that will be transcribed and that will form the empirical data for my thesis.
Plate 3: V, F and A working with TEO in a separate room

6.2 Human actors

The video recording and the related transcription feature three children of 8 years of age; two girls and a boy, from a second grade classroom. I selected this particular video recording because it featured children with different levels of proficiency in the target language - oral French. In this respect the video sequence is representative of the recordings made in the TEO project at the time, any of which could have been chosen for a similar analysis. However, this recording is atypical because it represents an interaction where a child diagnosed with a mild form of Down syndrome participated in the French language learning episode. As I had used this extract in many teacher and student training sessions because of its informative value about language learning in general, it is the video extract of the TEO corpus that I am most familiar with. I remain indebted to the
successive cohorts of students who have analysed the data from their own perspectives. My predilection for this particular video sequence also stems from its very interesting and surprising discourse structure.

The three children were videotaped at the beginning of the last term (after Easter) when oral French is introduced by the Luxembourgish curriculum. I have not replaced the names of the children, as they appear in the discussions among themselves and as their parents had granted permission for their use in the videotaped material to be published by the Ministry. As will become transparent in the analysis of the data, names are essential to every human being and hence should not be changed in my data. For convenience, I use their initials most of the time.

- Vanessa (V) is a Luxembourgish girl diagnosed with a mild form of Down syndrome. She is fluent in Luxembourgish and German, but not in French.

The teacher had adopted the strategy of integrating children with special needs into the normal delivery of the curriculum without subsidiary teaching by additional staff, a procedure not at all common in Luxembourg’s classrooms. Actually, teachers do have the right to refer children with special needs to certain pedagogical procedures and interventions which will result in the total or partial absence of these children during regular lessons. In Luxembourg, parents tend to accept such procedures as they often represent the only possibility for joining a regular classroom. Vanessa, however, was a full member of the classroom community and regularly participated in group activities, although she was given extra individual attention from her teacher. As for her participation in the TEO team, I consider that the normal teaching and learning strategies adopted by her teacher do not warrant Vanessa’s Down syndrome to be of particular influence in the language learning process.
- Anna (A) is a Luxembourgish girl. She is fluent in Luxembourgish and German, but not in French.

- Frédéric (F) is a French-Canadian boy. He is fluent in Luxembourgish, German and French.

On the still picture from the videotape we can see F sitting on an individual chair in the middle between V on his right and A on his left, also on individual chairs. All of the three are facing the computer and are looking at the TEO program on the screen. This spatial organisation, orientation or positioning virtually remains the same throughout the whole session, except for F moving further and further backwards during the production process. The absence of change in the spatial organisation is mainly due to the fact that the children are sitting on individual chairs, which restricts the scope for their body movements in a very substantial way.

The perspective of the camera offers the following spatial organisation throughout the videotaped material, with V manipulating the mouse with her right hand during the whole recording session, the other children never interfering with her handling the hardware and the TEO software:

![Figure 4: Position of V, F and A facing the screen with the TEO software](image)

It was unclear who took the decision to give V permission to manipulate the mouse and hence to control the TEO recording process: the children themselves or the teacher who tended to hand ownership and authorship in the oral language production process to a particular learner, in this case V, by allowing her to control the recording with the mouse.
In effect, this teacher always championed the personal authorship of his pupils in any curricular area. The physical manipulation of the mouse by V plays an important part in the work organisation of the TEO team and I will come back to it in my analysis of the role and function of TEO.

The video recording does not show the screen with the TEO software at any moment of the sequence, as the recording procedure of 1994, with only one camera available, privileged a view of the children facing the computer screen. These video data are the only original data available for analysis. Hence, I will briefly discuss the contribution of the methodology of video recording to the analysis of the role and function of TEO in the oral language learning process.

### 6.3 The methodology of video recording

In my thesis I will analyse how TEO impacts on the French oral language learning process of three children in a Luxembourgish second grade classroom that constitutes the sociocultural context of the learning episode. A ‘thick’ description (Geertz, 1993) of this setting, a typical procedure in ethnographic research, requires different qualitative and quantitative methods that allow for the description, the explanation and the interpretation of the role and the function of TEO.

A video camera is appropriate for gathering data in that the timing of audio as well as visual information is retained for analysis. A micro-analysis of the integrated whole of speech and co-occurring bodily behaviour during the storying event can also be carried out on the basis of video stills transferred from the videotape. In order to obtain valid videotaped data for the TEO setting, I must address the following questions (DuFon, 2002):

1) How should the interaction be video recorded?
2) Who should be video recorded?

3) Who should do the video recording?

As a fourth point I will also consider ethical issues.

As shown in Plate 3, the camera position adopts a single perspective from the left side of the screen and faces the three children, thus including all participants of the interaction. At the time of the recording in 1994 no other video camera was available and I thought the rather cumbersome professional device to be a little too intrusive to the setting. Nevertheless, the wide angle views succeed in generating a recording without any manipulation of the TEO setting, of the participants and of their script, that is, of what the participants say (DuFon, 2002). There was only one occasion where the video operator tried to bring back F into the frame of the video camera by moving him with his chair. This was considered not to unduly interfere with the TEO event as a whole, because there was no interruption in the filming and recording. This is a crucial point as the interpretation of the meaning of the participants’ utterances in the oral French language learning situation with TEO is influenced and dependent on previous and future utterances. The camera position in the recording is fixed and there is no zooming in for close up views. Hence, all participants are always in the frame (Streeck, 2009). The bodies of the children are captured by the camera from the waist up so as to visualise the body behaviour and simultaneously the utterances of the participants.

The question of who was recorded in the storying with TEO has already been addressed. Because the video data show real people in real situations doing real activities (DuFon, 2002), they provide a high density of data (Grimshaw, 1982) that convey a highly differentiated and more complete sense of who the participants are. In particular, video recordings help to accurately identify who is speaking and taking initiatives in the development of the interaction and learning sequence by providing information about attitudes, posture, gestures, clothing and proxemics such as gestures, facial expressions
and other visual cues (DuFon, 2002). Video recordings, more than field notes for instance, allow to keep track of and to transcribe every word, as the researcher can come back indefinitely to an event by re-playing it. Each repeated viewing, especially so when it is done after substantial breaks, leads to new insights (Fetterman, 1998).

DuFon (2002) lists as a limitation to the information available from video recordings the fact that the videotape does not directly tell anything about statistics, that is, how typical an event is. In my thesis however, the methods used for transcribing the recorded video data, that is the TranScripter tool described below, provides the researcher with the opportunity to represent the visual data graphically and also to have access to statistics concerning the recorded event. That said, we cannot know if the event in its totality is unique or frequent and hence typical and representative of the French oral language learning process that is to be accounted for. A second limitation rests with the fact that a video recording can only capture what is observable within the field of the camera. Any unspoken thoughts or feelings can only be unveiled when the video recording is played back to the participants who then can voice their opinions and give information about the unobservable. Due to the fact that the recordings of the work with TEO date back more than fifteen years they could not be re-presented to the three children involved or to the teacher. The only vicarious feedback that I was able to gather informally came three years ago when I watched the recording with students from the University of Luxembourg. One of the male students approached me after the seminar and voiced his surprise at the performance of V, whom he knew from his school years. He thought that the storying with TEO had shown him quite a different V from the one he had known before. The keenness and authoritative conduct from the TEO setting was not what he would have expected in V’s everyday behaviour. Although DuFon (2002) criticises the fact that videotaping only allows the event to be experienced vicariously and does not allow for hypothesis testing in the way participant observation does, Goldman-Segal (1998) believes that the participa-
tion of many different people in viewing, re-viewing and commenting on the video adds layers of interpretation to a platform for ‘multiloguing’ and hence weaves a thicker description than could be done by one researcher alone. The fact that over the years I have viewed and re-viewed the video recording to be analysed in my thesis with many students, teachers and experts can add to the validity of my study and of my findings as these multiple points of viewing have certainly helped to offset the limitations of my otherwise necessarily unique experience and interpretation.

As to the question who should do the video recording, the only option available at the time was using a professional video operator who was able to set up and manipulate a professional camera.

With regard to the ethical issues, the teacher who participated in the original TEO project had obtained prior consent from the children’s parents for the video recording, the use of the transcription and the publishing of the resulting data. The teacher had also explained to the children the context of the TEO project with the new possibilities for learning oral French. Pupils could choose TEO for the production of oral French, but they were free to adopt the traditional form of learning the oral language in the classroom community under the guidance of the teacher. When choosing TEO, the pupils were fully aware that they were video recorded and that their discussions were available for later analysis.

These ethical issues were considered important because ethnographic approaches using video recordings for gathering naturalistic data catch participants on the fly in a holistic context and could make them vulnerable to undesired intrusions into their privacy.

The video recording in itself will not be sufficient for tracing the role and the function of TEO in the team learning oral French through the process of storying. I will now justify the method of transcription to be achieved with the TranScripter tool.
6.4 The justification of the use of a tool for transcription

When analysing the role and function of TEO I aim to treat objects and persons at the same level in the group discourse by tracing the addressivity between the different team members during the language production process. Addressivity turns an utterance into meaningful dialogue (Haworth, 1999). I use the term addressivity to describe the capacity to address ‘otherness’ and respond to ‘otherness’; to signal reciprocity - not necessarily in harmonious or tolerant ways - in relation to a speaker or a text. As addressivity entails the articulation of personal perspectives in relation to others and in relation to knowledge, it transforms language into a group process. Addressivity designates ‘the quality of turning to someone else’ (Bakhtin, 1986, p. 99) and requires that the speakers’ utterances connect and enter into dialogue with previous utterances (which might transcend boundaries of space and time). Bakhtin’s (1984, p. 287) dialogical theory of language privileges communication: ‘To be means to communicate. (…) To be means to be for another, and through the other, for oneself.’ Bakhtin’s words refer to the functionality of all the actors in establishing a communicative system where they necessarily depend on each other.

In the terminology of Actor-Network-Theory the activity of language learning is spread out in the network and in the relations between humans and objects such as TEO (Mol, 2002). Bakhtin’s (1984, p. 287) ‘To be means to communicate’ is transformed by Actor-Network-Theory into: ‘To be [to produce, to perform, to learn] is to be related’ (Mol, 2002, p. 54). In the process of language learning in the TEO team there is then continuous interaction with a role distribution strongly dependent upon the nature of the software and
the tools being shared (a screen, a keyboard, a single mouse) and probably upon the students’ perception of the limited time available (Golay Schilter et al., 2003).

In order to visualise this continuous process I use a transcription tool that captures all the participants in the ongoing dialogue on an equal level, without privileging any of the human or nonhuman actors in the process. The transcription tool makes the transactions visible by tracing the circulations within the provisional, unexpected, unstable and chaotic aspects of the social interactions. I can find how a mediator like TEO makes other mediators do things. Because of these attachments, TEO comes into prominence and into existence (Latour, 2005). The transcriptional tool shows the presence of TEO and helps to define TEO as a nonhuman actor in its own right. Its presence, role and function in the discourse of the TEO team must not be relegated to the background, but could at times even become a material requirement for the activity of storying to be continued. In children’s play the same principles apply, for even if in one sense children at play are free to determine their own actions, they must always subordinate to the thingy aspects of activities by acting according to the meanings of things (Vygotsky, 1978).

When we act, who else is acting? How many agents are also present? We should see action as a knot, a node or a conglomerate of sets of agencies (Latour, 2005). Actions come as a surprise and are produced within ramifying networks of social and material relations (Suchman, 2007, Gell, 1998) that are made visible by the transcription tool. Latour (2005) coins the term ‘worknet’ instead of ‘network’ for exemplifying the work, the movement, the flow and the changes that should be stressed and visualised in the transcription tool because the tools or nonhuman actors like TEO always modify the goals we thought to control autonomously.

Besides making visible the role and function of TEO, the transcription tool must allow for a second by second ethnomethodological account of the situated and improvised
practice of human and nonhuman actors. It provides a visual representation of the building of language as it takes place in the flux of the moment. In order to be able to analyse the data as revealed through the transcription process I must follow the human and nonhuman actors in the language production process with TEO. I will specifically follow TEO as it is being enacted in practice (Mol, 2002) in order to describe and hence detect its particular role and function in the team language production process. It will then become possible to discuss, to confirm or to reject TEO’s status as a nonhuman actor.

I will give a short description of the tool that I chose for the transcription of the episode of language production with TEO: TranScripter.

6.5 TranScripter: a transcription tool for following the actors

TranScripter is an ideal tool for combining the processes of description and transcription. It was specifically developed for the use within the ‘Languages, Culture, Media and Identities’ research unit of the ‘Faculty of Language and Literature, Humanities, Arts and Education’ of the University of Luxembourg and is commercially available.

TranScripter allows for transcription of each turn of the participants in the discourse and shows how the activity progresses over time. Human and nonhuman actors can be visualised. Each turn is characterised by the following descriptors:

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>turn – represented by a running number</td>
</tr>
<tr>
<td>Agent</td>
<td>name of the human or nonhuman actor</td>
</tr>
<tr>
<td>Pseudo</td>
<td>the human or nonhuman actor’s abbreviated name</td>
</tr>
<tr>
<td>Start</td>
<td>point in time of the beginning of the turn (in seconds)</td>
</tr>
<tr>
<td>End</td>
<td>point in time of the end of the turn (in seconds)</td>
</tr>
<tr>
<td>Message</td>
<td>content of the turn</td>
</tr>
<tr>
<td>Languages</td>
<td>all the languages used in a turn can be visualised</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Catchword</td>
<td>one or more catchwords can be assigned to each turn</td>
</tr>
<tr>
<td>Comment</td>
<td>comments can be assigned to each turn</td>
</tr>
</tbody>
</table>

TranScripter has two main displays that are featured in this analysis. The first display shows the above descriptors as column headings with the textual transcription of each turn in rows, as can be seen in Figure 5 (reversed for better clarity).
Figure 5: TranScripter's textual display
TranScripter offers a search function that enables the user to scan the turns, the message, the catchwords and the comments for specific keywords. Additional commentaries can be posted in a special side window with references to author, date and last modification. TranScripter can be linked to the source time coding of the computer’s Quicktime program by a start and end button, thus enabling the analyst to exactly mark the beginning and the end of each actor’s turns in the discourse. The analyst can delve into the micro-processes and dynamics of the discourse through intensive fine-tuning between the turns of the discourse. The last feature is enhanced through the possibility of slowing down the speed of the video recording.

The second feature of TranScripter is the graphical display of the transcription and of the turns that can be created. The resulting diagram is a timeline; a two-dimensional representation with time as the one dimension and the level of activity of each actor as the other. I will illustrate this feature by reproducing one part of the graphical display of the transcription above in Figure 6 (reversed for better clarity).
Figure 6: TranScripter's graphical display
The graphical display shows horizontal bars for each actor or participant in the discourse. Each bar symbolises the length of the turn in seconds. Bars are numbered according to the onset of their appearance in the sequence of turns. By applying a vertical reading of the graphical display one can easily identify overlapping turns and immediately engage in a visual analysis of the distribution of the turns among the participants. From this display the discourse can be scanned for events that are particularly relevant: the activity of human and nonhuman actors, or the appearance of ‘stormy’ parts of the discourse as signalled by many overlapping turns. The colours of the bars represent the different languages used. Two-colour bars symbolise utterances that are composed of parts of each language or of words belonging to the lexicon of the two languages. It is possible to highlight different turns (interesting adjacency pairs, for instance) that will then become visible in a different colour in the graphical display, thus allowing for an instantaneous visual analysis along different criteria.

TranScripter offers an immediate statistical analysis of the stretch of discourse under study. In Figure 7, the total activity of the different agents in all languages is shown in percentages of the total recorded discourse with the total time in seconds per agent listed.

Figure 7: Total activity in all languages per agent in seconds and in percentage of the total discourse
The use of different languages (for instance German, French, Luxembourgish) by individual actors is also given in percentages of the total discourse with the total time per agent also listed, as shown in Figure 8.

Figure 8: Total activity in different languages per agent in seconds and in percentage of the total discourse

The total number of turns in each language by all the participants for the stretch of discourse under transcription is also given, as shown in Figure 9.

Figure 9: Total number of turns in each language (frequency) by all the participants for the stretch of discourse under transcription
Statistical analysis of the occurrence of particular words in the whole as well as in parts of the transcription is possible.

Through visualising the interaction of human and nonhuman actors in the chosen stretch of discourse, TranScripter closely matches my requirements as a tool for describing the language production process in the TEO team.

Before presenting the transcription of the stretch of discourse chosen for my thesis, I now describe how the topic of the children’s storying activity has been transcribed with TranScripter.

6.6 Methodological considerations, options and conventions for the transcription

The transcription of ‘La Famille’ (The Family), a title chosen and typed by the children just before the beginning of the selected video section, comes close to what Varenne and Rizzo-Tolk (1998) describe as anchoring in the pragmatics of everyday life and as fitting within a tradition of classroom analyses criticised for making much about little. In effect, the children at length try to elaborate a conversation or dialogue where the names of members of their respective families play a major role. The discussion is mainly about the names of brothers and sisters and about their relationship to the authors of the story.

However, the narrative frame or storying constituted by familiar names and by episodes linked to these names allows for participation in the ongoing interpretation of the utterances produced in a given culture. There is nothing more pragmatic than asking for one another’s names when different people meet. The transcription captures the dialectical move between the narrated story and the narrative event of the telling of the story (Bauman, 1986).
In order to add to the information of the transcription and of the graphical displays created through TranScripter, I will incorporate stills from the videotape into my analysis. In some cases these stills have been included into the printed extracts, in other cases they have been commented upon. The stills visualise what happened in the TEO setting. Of course, stills cannot capture the dynamics of discourse, gestures and positionings, a point made by Streeck (2009, p. 32): ‘Photography cuts movement into arbitrary segments, often capturing an act at an insignificant, figure-less stage: the single photograph may be meaningless because it does not capture the Gestalt that participants apprehend.’ However, we get an idea of the gazes and the emotional behaviour as well as of the alternation of positionings at certain moments in the dialogue. The chosen still pictures must be viewed at exactly the same time as the transcription is laid out in front of the reader and as the interpretation that I am making is being read. The stills will prevent me from making mistakes in my account of the episode by clarifying my work of reference to the transcribed section (Latour, 1999).

The static and linear image of the written transcription as well as the relatively static written sound reproduction of the oral language are a long way from conveying a comprehensive understanding of the dynamics of the discourse that I will try to access through an analysis of the stills. A visual analysis helps with capturing activity in the complex network of the TEO production process and in what George Herbert Mead called a conversation of gestures (Varenne and McDermott, 1998).

It is precisely the overlapping and the interpenetration of gestures, gazes and spoken discourse that reveal the limitations of structural analysis. When one looks at the videotape and transcribes it, oral language seems to come second to positionings of the bodies, to gestures and gazes. The metaphor of ‘incorporation’ serves as a useful description of this phenomenon of overwhelming presence of bodily features (Varenne, 1998). The bodily features are best revealed through the procedure of silent playback of
the video material. Silent playback provides important cues for re-examination of the
behaviour (Birdwhistell, 1970) and helps to discover the richness of the corporeal and
attitudinal features involved in the communication and storying process.

While transcribing with TranScripter I have simplified the marks of oracy for the
purpose of easy reading. Some conventions have been adopted from Wells (2001):

**Layout**

The stream of speech is transcribed continuously.

Speakers are indicated by the initial letter of their names.

. One full-stop marks a perceptible pause. Thereafter, each full-stop

  corresponds to approximately one second of pause, for example ‘I have no

  sister … I have a brother.’ indicates 3 seconds of pause.

? ! These punctuation marks are used to mark utterances that are judged to

  have an interrogative or exclamatory intention.

**CAPS**

Capitals are used for words spoken with emphasis, for example ‘What is

  the name of HER sister?’

[] Square brackets enclose translations of Luxembourgish (LUX) and French

  (FRENCH) utterances.

I have adopted the turn as the basic unit of analysis in the transcription (Sacks et al.,
1974). Turns are numbered in the order of events. Rising and falling intonations are not

  transcribed, but at certain times indications are included into the transcription within

  parentheses, as may also be the case with other features of the discourse that are

  considered as particularly informative at that particular time of the language production

  process. A too detailed and too fine-grained transcription jeopardises the attention of the

  reader to the dynamics of the activity under analysis, a dynamic that constitutes and

  instantiates the language learning sequence of the three children with TEO. However, I will

  provide for the details of the stretches of discourse and turns that I regard as highly
important in my description and discussion of the sequences, e.g. remarks on prosody and intonation. Elements of naturalistic talk such as gaps and pauses, breathiness and laughter are represented in the stills as they characterise the ongoing dynamics of the activity.

The children alternate and switch between languages in the storying process, using Luxembourgish for discussing and launching the recording of the French utterances. This language alternation, code-switching or translanguaging can occur within the conversation between the participants or even within a single utterance or a single turn of one particular participant. I have not chosen to distinguish the two languages in the original transcription. However, as the multilingual data necessitate translation for the reader, I have provided this translation in brackets under the original turn with a marking of LUX for Luxembourgish and FRENCH for French in order to keep the reading process flowing, as shown below:

<table>
<thead>
<tr>
<th>Turn</th>
<th>Speaker</th>
<th>Start Time</th>
<th>End Time</th>
<th>Original Turn</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>159</td>
<td>A</td>
<td>373.77s</td>
<td>377.20s</td>
<td>Comment s'appelle ton frère? Soen ech elo.</td>
<td>[What is the name of your brother? FRENCH I'll say that LUX]</td>
</tr>
<tr>
<td>160</td>
<td>V</td>
<td>377.67s</td>
<td>380.23s</td>
<td>Ok … soen ech?</td>
<td>[Ok … do I say that? LUX]</td>
</tr>
<tr>
<td>161</td>
<td>A</td>
<td>380.05s</td>
<td>381.97s</td>
<td>Comment s'appelle ton frère?</td>
<td>[What is the name of your brother? FRENCH]</td>
</tr>
</tbody>
</table>

Turns are numbered consistently from the start to the end of the video sequence under transcription. The start and the end of each turn are indicated in seconds that indicate their placement in the total stretch of discourse. Overlapping of discourse can be identified through the graphical display of TranScripter as well as through its detailed timings.

Stills from the video will be provided whenever they are needed to illustrate processes and attitudes and to highlight the embodied nature of the language learning and development. Describing verbally the events in which the language skills are manifested is the best method for describing the mediating structure under which the skills developed
(Hutchins, 1996). At times, the mediating TEO tool attracts the attention of the human actors during the recording of their particular utterances. The children’s gaze then changes direction and they turn their attention away from each other to the tool that is assisting them in the learning of the oral French language. The direction of the participants’ attention is embodied in their gazing at the computer screen, at themselves or beyond the actors of the TEO team. Kestrell Verlager (2008, p. 38) refers to ‘looking’ as ‘a turning towards, a gesture rather than an information-gathering process [and as] an invitation to communication.’ Hence, looking, gazes, facial expressions and other visual interactional cues are constitutive of communicative language performance as they provide important information both on the negotiation of meaning and the negotiation of affect in the language learning sequence (DuFon, 2002). The intensity of the gazes will also indicate the human actors’ implication in the TEO team effort. Such contextual information enriches the data of the TEO setting in many ways. Hence, it is important to account for the gazes of the participants in the TEO team as they play a role in the managing of the continuation of the discourse as joint experience. The direction of the human actors’ gazes will also give indications of the role and the function of TEO in the TEO team language production process, especially when gazes focus on the computer screen and on the TEO software. This is the reason why I have paid special attention to the encoding of the gazes in the transcription.

The focus is on the participant’s gazes; whether or not one looks at the others for at least some part of the speaking turn and, if not, whether one’s gaze is directed to the current focus of joint attention. Initials are used to identify participants and X to indicate the screen where TEO is displayed or some other focus of joint attention. I have rigorously transcribed the whole sequence under analysis in this way. I will use this material for the discussion of the parts of the transcription where the gazes trace the role and function of TEO. However, this part of the transcription process will not appear in the transcribed
material reproduced on the page for the reader. In my transcription effort I have used the following conventions:

> Unidirectional gaze by participant
<> Reciprocal gaze between participants

I will use parts of the total transcription of the sequence ‘La Famille’ (‘The Family’) as will be necessary in the development of the analysis of the role and function of TEO in my thesis.

Earlier on I compared the process of storying between the three children and TEO to a team effort. I have deliberately chosen the metaphor of the TEO team to represent the association of human and nonhuman actors engaged in the oral French language learning activity under study. As the particular interest in my thesis lies with the mediating tool TEO, it must figure prominently when it comes to unravel its role and function in the oral French language learning process. In order to follow TEO in the language production process it is necessary to visualise the interventions of the different actors with TranScripter. I will first consider the whole transcription in order to localise the appearance or the ‘talking’ of the TEO tool on the scene by looking at the graphical display. I will then look for the corresponding transcription segment and try to analyse the role and function of TEO in this particular segment.

All the turns of the human and nonhuman participants in the language production process are continuously and sequentially numbered according to the onset of the particular utterance. Consequently, there are lines for the human actors V, A and F as well as for the nonhuman participant TEO. There is also a line for synchronic utterances of F+V and F+A, as well as for the video operator (VO), but these are unique occurrences. The blocks on the lines representing the utterances are coloured in blue for Luxembourgish and in yellow for French. Blocks that are split in two colours represent an utterance that is
composed of parts of each language or of words belonging to the lexicon of both languages. Each block features the number of its turn in the sequence. As the first utterance comes from V, I have put her on the base of the visual display followed by the other human actors. I have decided to put the nonhuman actor TEO on top of the three children, as the utterances of F + V, F + A and VO are just marginal events.

In order to enhance the readability of the graphic display I have divided the whole transcription into stretches of 30 seconds. I am aware that it is problematic to scan the team language production process for details or individual components as utterances are articulated in consequence of what has already been uttered by the speaker and with regard to his/her possible future utterances, and in reaction to the previous utterances of an interlocutor, as well as in anticipation of that speaker’s potential future responses not yet said (Danow, 1991).

Language is enacted not as a solo performance, but as a team production with texts being produced in contexts. Utterances always address someone and are addressed in return. Their meanings develop in a dialogical and dynamic effort when they come to fulfil a certain function for others in the interaction (Elias, 1983).

I have chosen to incorporate the statistical data provided by TranScripter into the analysis of the body of transcription, even if statistics represent a very static notion. The statistical data help to differentiate my analysis at different points as they render transparent the distribution of the oral language production between all the actors of the TEO team. They quantify the talk in a different manner from the coloured blocks in the TranScripter graphics. Overall time of the language production process and the percentage of the individual contributions in relation to the totality of the discourse are easily calculated. Although it is clear that these quantified data cannot say anything about the quality of the specific contributions, I find them useful when it comes to the distribution
between the Luxembourghish and French language and its relative distribution in between the participants in the storying process. The statistically quantified data reveal the cumulative and distributive event of language production and could be compared with children’s language activities in regular classroom interaction and language learning situations. However, I prefer to focus on how the relative importance of the quantified amount of language chosen and spoken by each member helps to indicate the role and function of TEO in the language production process.

Hence, in the analysis of the transcription of the little more than ten minutes of discourse it is beneficial to combine some of the statistics made available through TranScripter with the visual graphics of the coloured blocks. The first important point that can be made visually and statistically is to establish the ratio between

- Luxembourgish (LUX), which is used primarily for talking about the contents and the process of the story, for planning and evaluating the content of the story, for discussing, reflecting and correcting the use of French in the story, for managing the functioning of the group and the running of the task and

- French (FRENCH), which is used for finalising the story in this official target language of the school’s curriculum.

The articulation between Luxembourghish and French reflects one of the central tenets of Vygotskian theory concerning second or foreign language learning. I intentionally disregard Vygotsky’s terminology, which is - for obvious reasons of contextual use - highly dependent on historical circumstances. Vygotsky (1986, pp. 195, 196) sees foreign language learning as a cognitive process where the learning, of French in our case, is mediated through the concepts and competences already developed in Luxembourghish: ‘Success in learning a foreign language is contingent on a certain degree of maturity in the native language. The child can transfer to the new language the system of meanings he
already possesses in his own.’ Vygotsky (1986, p. 196) would consider the learning and development of Luxembourgish and French as cross-fertilising and as reverse processes leading up to conscious language use: ‘The reverse is also true – a foreign language facilitates mastering the higher forms of the native language. The child learns to see his language as one particular system among many, to view its phenomena under more general categories, and this leads to awareness of his linguistic operations.’ I will briefly discuss some findings related to the distribution of language use among the participants in the TEO team.

### 6.7 Findings related to the distribution of language use among the participants in the TEO team

From Table 10 below, the frequency of turns in the total transcription is almost evenly distributed between both languages, Luxembourgish and French. This finding is very often contradicted by spontaneous ratings of students in my seminars who rely on the videotaped session only and who seem to overestimate the importance of the Luxembourgish language in the construction process at the cost of the French language embodying the product and the end of the learning process.

<table>
<thead>
<tr>
<th>Language</th>
<th>Total frequency of turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>125</td>
</tr>
<tr>
<td>Luxembourgish</td>
<td>134</td>
</tr>
</tbody>
</table>

Table 10: Total frequency of turns in French and Luxembourgish

The distribution of the Luxembourgish/French ratio among the four main actors in the language production process is shown in Table 11. VO and F + A are not considered in the table. In all tables dealing with percentages I have kept two decimal places. These
data are automatically calculated by TranScripter and are not intended to give the impression of higher scientific validity.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Language</th>
<th>Percentage</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Luxembourgish</td>
<td>17.40 %</td>
<td>1m45.54s</td>
</tr>
<tr>
<td>A</td>
<td>French</td>
<td>9.80 %</td>
<td>59.45s</td>
</tr>
<tr>
<td>V</td>
<td>Luxembourgish</td>
<td>17.33 %</td>
<td>1m45.12s</td>
</tr>
<tr>
<td>V</td>
<td>French</td>
<td>14.94 %</td>
<td>1m30.62s</td>
</tr>
<tr>
<td>F</td>
<td>Luxembourgish</td>
<td>16.77 %</td>
<td>1m41.71s</td>
</tr>
<tr>
<td>F</td>
<td>French</td>
<td>6.79 %</td>
<td>41.18s</td>
</tr>
<tr>
<td>TEO</td>
<td>Luxembourgish</td>
<td>0.81 %</td>
<td>4.91s</td>
</tr>
<tr>
<td>TEO</td>
<td>French</td>
<td>14.90 %</td>
<td>1m30.37s</td>
</tr>
</tbody>
</table>

Table 11: Distribution of Luxembourgish/French ratio among the four main actors in the TEO team

Luxembourgish is almost evenly distributed among the three human actors in the TEO team. This can be an indication for an efficient group process in the discussion and elaboration of the French story. All three human members appear to embody a similar status at least in the storying process and even in the face of a differential status as related to their official competence in French.

The picture is different when we have to account for the distribution of French among the participants in the stretch of discourse. First of all, a new actor enters the scene. Whereas TEO only accounted for 0.81 % of the language activity in Luxembourgish, it largely outperforms A and F in the use of French, being narrowly beaten only by V. Analysis of the language activity shows that V has to be considered as an eager and successful learner in that she is the most active user of the target language French. A talks French almost half as much as V, being underbid by the ‘official’ expert in the group, F, who is the actor speaking French seemingly ‘à la carte’. I will later identify the role and the function of the nonhuman actor TEO performing almost exclusively in French.
In Table 12 the total percentage of language activity in Luxembourgish and French for all the actors (VO, F + A being omitted again) is given.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Percentage</th>
<th>Activity in Luxembourgish and French</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>35.53 %</td>
<td>3m35.33s</td>
</tr>
<tr>
<td>A</td>
<td>27.39 %</td>
<td>2m45.96s</td>
</tr>
<tr>
<td>F</td>
<td>24.49 %</td>
<td>2m28.40s</td>
</tr>
<tr>
<td>TEO</td>
<td>15.82 %</td>
<td>1m38.60s</td>
</tr>
</tbody>
</table>

Table 12: Total language activity of the four main participants in the TEO team

It is interesting that V who is accounted for as the learner of French in the team is doing most of the talking in the sequence under analysis. F who officially acts as an expert in the TEO team talks less during the combined Luxembourgish/French production process. This is in opposition to general classroom behaviour where experts often hold the floor and prevent lesser talented learners from entering the learning scene. It is important to remember that the little more than ten minutes stretch of discourse is under total control of the TEO team with no interference from the teacher. The only intrusion into the stream of discourse of the human actors is by the nonhuman actor TEO and is performed almost exclusively in French.

Considering that TEO does not actively instantiate Luxembourgish, the most astonishing factor in this team learning process is the almost even distribution of time on task, i.e. the use and learning of French vocabulary and structures, between the human actor V and the nonhuman actor TEO, a point I will come back to later in my thesis. As revealed in Tables 10, 11 and 12, activity is largely and fairly distributed among all the human and nonhuman actors in the Luxembourgish/French language production process. However, as any artefact, in our case the nonhuman actor TEO, has the potential to change the activity, I want to understand how the introduction, the participation and the use of TEO come to affect the individual and social processes of the language learning
activity. The analysis of the role and function of TEO in the TEO team must encompass the mental processes of the individuals performing the activity, as these will affect how an artefact like TEO will be used (Bellamy, 1996). I will refer later in my analysis to individual mental and affective states having an impact on the proceedings of the TEO team.

In order to highlight the role and the function of TEO in the oral French language learning process I will now analyse the graphical and textual transcription of the video data collected for this thesis.

It is clear that the possibility to manipulate the stretch of discourse on a computer frame by frame, to loop small segments of the soundtrack, and to jump around easily, backward and forward with TranScripter linked to the video, enables me to access the tiniest details of the interaction and of the team language production process. Identifying the role and function of TEO in the storying process can only proceed from the close inspection of the details of the discourse between the TEO team members. Therefore, the textual transcription includes, in addition to the words spoken, indications of other sounds, intonations, pauses, gestures, gazes, and other nonverbal cues that were visible in the tape. Digital video coupled with TranScripter allows repeated and detailed viewing to produce a useful transcription and to discover how a real instance of collaboration and performance in the production of Luxembourgish and French takes place (Stahl, 2006).
7 The role and function of TEO in the oral French team language production and learning process; detailed data analysis

In this chapter I will analyse the data in order to characterise the TEO tool, its specific roles and functions, its dependence and independence from other members of the TEO team in the oral French learning process (Bourdieu, 1996). At the end of this analysis I will then consider the extent to which my data are consistent with or not consistent with the characterisation of an object like the TEO tool as a nonhuman actor in the network of the team language production process (Latour, 1989, 2005, 1999). It is clear that due to my personal trajectory I have some prior understanding of the possible characterisation of the TEO tool. This does not necessarily pre-empt my research as it is a well known paradox of research that one must possess some prior understanding of the subject matter to investigate it properly (Ratner, 2002). With these reflections in mind, I will jointly analyse the graphic display, its inherent statistical data and the transcription in conjunction with the video stills in order to follow the TEO tool and see how it behaves in the process of language production by the TEO team members.

The first appearance of TEO occurs rather late in the graphic and in the transcription. TEO first enters the scene in Turn 38 after more than one minute and a half of intense communication between the three human actors in the language production team.

7.1 Analysis of the data before the appearance of TEO

Graphics 13-15 illustrate the discourse and interaction before the appearance of TEO. The horizontal axis indicates the timing of the recordings in stretches of ten seconds. The vertical axis indicates the three human actors V, F and A by their initials, the nonhuman actor TEO, the unique and marginal simultaneous interventions by F+A and by the video operator (VO). As already noted, the utterances and contributions of each of these actors
are represented by coloured bars, blue for Luxembourgish and yellow for French. A small icon in the upper right hand corner of each graphical display recapitulates this convention.

Graphics 13-15: Discourse and interaction before the appearance of TEO

The statistical data offered by the graphical display indicate the frequency of turns for each language by all participants before the appearance of TEO:
The statistical data offered by the graphical display also indicate the distribution of the Luxemburgish/French ratio among all the participants in time and percentage before the appearance of TEO.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Language</th>
<th>Percentage of utterances in each language per participant before the appearance of TEO</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Luxembourg</td>
<td>21.06 %</td>
<td>19.12s</td>
</tr>
<tr>
<td>A</td>
<td>French</td>
<td>8.14 %</td>
<td>7.39s</td>
</tr>
<tr>
<td>V</td>
<td>Luxembourg</td>
<td>25.92 %</td>
<td>22.71s</td>
</tr>
<tr>
<td>V</td>
<td>French</td>
<td>10.66 %</td>
<td>9.35s</td>
</tr>
<tr>
<td>F</td>
<td>Luxembourg</td>
<td>30.35 %</td>
<td>27.55s</td>
</tr>
<tr>
<td>F</td>
<td>French</td>
<td>9.22 %</td>
<td>8.37s</td>
</tr>
<tr>
<td>F + A</td>
<td>Luxembourg</td>
<td>0.00 %</td>
<td>0.00s</td>
</tr>
<tr>
<td>F + A</td>
<td>French</td>
<td>6.19 %</td>
<td>5.92s</td>
</tr>
</tbody>
</table>

(Due to the simultaneous utterance by F + A the percentages are approximative.)

Table 17: Distribution of the Luxemburgish/French ratio among the participants before the appearance of TEO

It emerges from the data above that in the first 90 seconds of the work in the TEO team the target language French accounts for about a third of the total language production, the parts being almost evenly distributed among all the human actors. We can
also have a look at the distribution of the total language activity among the participants before the appearance of TEO:

<table>
<thead>
<tr>
<th>Actor</th>
<th>Percentage of utterances in both languages per participant before the appearance of TEO</th>
<th>Activity in Luxembourghish and French</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>35.33 %</td>
<td>31.79s</td>
</tr>
<tr>
<td>A</td>
<td>29.45 %</td>
<td>26.51s</td>
</tr>
<tr>
<td>F</td>
<td>39.91 %</td>
<td>35.92s</td>
</tr>
<tr>
<td>F + A</td>
<td>6.25 %</td>
<td>5.62s</td>
</tr>
</tbody>
</table>

(Due to the simultaneous utterance by F + A the percentages are approximative.)

Table 18: Total language activity of participants in the TEO team before the appearance of TEO

The expert F is contributing the most to the language activity before the appearance of TEO with the targeted language learner V coming in second very close to the expert and with A contributing significantly to the discourse. In the sequence leading up to the appearance of TEO the children are first discussing orthographical matters as the TEO software offers them the possibility to write the title of the story that they are about to record with TEO.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V</td>
<td>0.00s</td>
<td>2.59s</td>
<td>Do ma mor dat aus. [Let's erase that. LUX]</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>3.59s</td>
<td>5.78s</td>
<td>La Famille! [The Familly! FRENCH]</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>3.72s</td>
<td>4.74s</td>
<td>Vanessa!</td>
</tr>
<tr>
<td>4</td>
<td>V</td>
<td>5.62s</td>
<td>9.74s</td>
<td>An don i ... de langen... esqueen. [And the i ... the long one... such one. LUX]</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>0.66s</td>
<td>12.46s</td>
<td>Dat as keen. ... Dat as o Jot.  [That's not the one. ... That's a J. LUX]</td>
</tr>
<tr>
<td>6</td>
<td>V</td>
<td>12.77s</td>
<td>16.47s</td>
<td>Ah ... Famille? [Ah ... Famililie? FRENCH]</td>
</tr>
</tbody>
</table>
In Turns 1 to 6 the human actors use the potential offered by TEO for switching from oral to written discourse. In particular, V struggles with the writing of the French word ‘Famille (Family)’ which is the title of the story to be recorded. As we cannot see the screen I have to speculate about the context of the discussion. Certainly F has noticed that V does not know the correct spelling of the French word. In Turn 1 V is already erasing some part of the word as F in Turn 2 insists on the writing of the title ‘La Famille’ by overstressing the ‘i’. While being softly alerted by A in Turn 3, V takes up F’s lead in a clear reference to her knowledge of German phoneme-grapheme correspondences. If she applied this knowledge to the sounding of the French word, then she would get the writing wrong. V signals that she has got F’s message by confirming in Turn 4 that she must use the ‘ie’ or ‘long i’, as it is commonly called in Luxembourgish classrooms, during the alphabetising process. This strategy would result in the wrong spelling of the word as ‘Famielle’ or probably even ‘Famie’ as the part constituted by the letters ‘lle’ is mute. The process appears to be very complex and difficult for V, but equally so for the expert F. In Turn 5, F signals that V has must not write ‘ie’ but ‘j’ which also represents a possibility arising from sounding out the word in the German phoneme-grapheme system. The result would then look like this: ‘Famij’. This is not such a big surprise, as the expert F has also been alphabetised in the German language for almost two years and obviously cannot resort to knowledge about the French phoneme-grapheme correspondences. He also does not seem to master the conventional forms of written French. As a result of F’s insistence, V hesitatingly confirms F’s choice by tentatively rearticulating the word ‘Famiille’ as ‘Famij’. For the moment, the children leave the written mode as A continues with an unrelated utterance that is needed for the continuation of the oral story:

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>A</td>
<td>16.75s</td>
<td>21.51s</td>
<td>Also Hem Wëi heescht ...? ... Wëi seet een 'dSchwester'? [Then Hem What’s the name for ...? ... How do you say 'the sister'? LUX]</td>
</tr>
</tbody>
</table>
The children’s and especially V’s and F’s discussion of the correct spelling of the word ‘Famille’ offers an illustration of Bakhtin’s definition of utterance. The title ‘The family’ as an utterance is important for the human actors as the insistent discussion encapsulates their personal nuances and overtones, their individual and collective voices striving to develop a story about their unrepeatable experiences within their own families (Saul Morson and Emerson, 1990). The children are truly speaking personalities, speaking consciousnesses with wills or desires, timbres and overtones (Bakhtin, 1981b). A simple word, a simple title creates the entire dramatic scenario for the whole process of storying (Paley, 1997) and builds the foundations for linking emotion and cognition in the process of personal becoming. This episode of talk about the correct writing of the word ‘famille’ sets the stage for our understanding of the content of the discourse that will be negotiated in the following turns.

From Turn 7 to 14 below the children very hesitatingly and painstakingly establish in Luxembourghish the semantic content of the stretch of discourse that is to continue the process of storying about their families.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>A</td>
<td>16.75s</td>
<td>21.51s</td>
<td>Also Hsm Wëh heescht ... ? ... Wël soit eon ‘d Schwestor? [Then Hsm What's the name for ...? ... How do you say 'the sister'? LUX]</td>
</tr>
<tr>
<td>8</td>
<td>V</td>
<td>18.10s</td>
<td>19.14s</td>
<td>Wot soit? [What does say? LUX]</td>
</tr>
<tr>
<td>9</td>
<td>A</td>
<td>21.80s</td>
<td>23.96s</td>
<td>Deng Schwestor heescht. ... eh [Your sister's name is ... eh LUX]</td>
</tr>
<tr>
<td>10</td>
<td>F</td>
<td>25.69s</td>
<td>31.71s</td>
<td>... Eh ... hm ... (hesitating) Wëlls du d’V, froen 'Wël heescht deng Schwestor? ... odor wët? [... Eh ... hm ... (hesitating) Do you want to ask V 'What is the name of your sister'? ... or what? LUX]</td>
</tr>
<tr>
<td>11</td>
<td>A</td>
<td>31.09s</td>
<td>36.47s</td>
<td>Nee, ech wel soen 'Meng Schwester heescht. Wël dat d’V freet 'Wël heescht deng Schwester?' [No, I want to say 'My sister's name is. I want V to ask 'What is the name of your sister'? LUX]</td>
</tr>
<tr>
<td>12</td>
<td>F</td>
<td>35.80s</td>
<td>37.71s</td>
<td>Ok</td>
</tr>
<tr>
<td>13</td>
<td>V</td>
<td>36.59s</td>
<td>40.54s</td>
<td>Ech hu keng Schwester ... ech hun ee Brudder. [I have no sister ... I have a brother. LUX]</td>
</tr>
<tr>
<td>14</td>
<td>F</td>
<td>39.63s</td>
<td>46.57s</td>
<td>Nee du frees hm d’A hm ‘Wël heescht SENG Schwester?’ [No you ask 'hm A hm 'What is the name of HER sister'? LUX]</td>
</tr>
</tbody>
</table>
In Turn 7 A first inquires about the French word for ‘the sister’, then proceeds to formulate in Luxembourgish an invitation to V with a hand and finger movement to produce the sentence ‘Your sister’s name is …’ As the sequence does not seem clear at all to F, he hesitatingly looks for clarification in Luxembourgish: ‘Do you want to ask V 'What is the name of your sister?’ … or what?’ A clarifies her intentions, always in Luxembourgish: ‘No, I want to say 'My sister’s name is’.’ I want V to ask 'What is the name of your sister?’ F agrees with A on the turn allocation while, in overlapping, V claims in Luxembourgish: ‘I have no sister … I have a brother.’ This remark calls for another clarification by F in Luxembourgish: ‘No you ask him A him 'What is the name of HER sister?’ Turn allocation is now entirely established and clarified so that V can continue in Luxembourgish with asking for the sentence structure in French: ‘And what will I have to say?’

Before continuing with the analysis of the discourse inside the TEO team I will reflect on the intensive use, on the role and on the function of Luxembourgish in the language production process with TEO.

7.2 The role and the function of Luxembourgish in the team language production process with TEO

In the sequence above the whole introductory work of the three children is about preparing the ground for a conscious use of a French structure yet to be established in the discourse and with the help of a more capable peer, in this case F. There have been claims in theories of second language acquisition that, as applied to our case, the acquisition of French as a second language is mediated and regulated through the use of Luxembourgish as a first language: ‘A first language allows us an opportunity consciously to represent the meanings of a second. To deny ourselves this semiotic opportunity is to deny ourselves the possibilities that language affords us’ (Holme, 2004, p. 209). In the case of the storying activity in the TEO team, Luxembourgish not only mediates the text
that is produced in French, but Luxembourgish is at the same time widely used to prepare and elucidate the context in which the French utterance takes its meaning. Hence, Luxembourgish is not only used as meta-talk about the correct French words and structures, but it also allows for collaboration, interaction and performance which otherwise would probably not occur, thus promoting a highly motivated attitude towards the learning of French (Lantolf, 2000a, Lantolf and Thorne, 2006). Talk in Luxembourgish between the TEO team members could be assimilated to group conversation mediating the ‘social creativity’ of the group where members can come up - in our case in the area of language learning - with new resources for reframing problems and developing creative designs in French (Kaptelinin and Nardi, 2006).

Recently, there has been in Luxembourg’s official educational guidelines an emphasis on the learning of the national language Luxembourgish as the most important factor of integration for the diverse cultural entities of the country, at all school levels from preschool to university. In this respect, the work with TEO keeps the Luxembourgish language in place by allowing all the children to use it efficiently as an instrument and a ‘lingua franca’ in the joint construction of the utterances. Luxembourgish acts as a vehicle for creating a common cultural background for the grounding of the story. TEO offers possibilities for enhancing the time devoted to the practice and development of the Luxembourgish language even as it serves the task of developing the mastery in the curricular target language French.

Turn 15 introduces the pivotal switch for the transition to the production of French. This switch takes place in a very dynamic way through discourse where each turn tunes in finely on the previous one with a very slight overlapping as shown below.
7.3 The overlapping of utterances

The process of coding the sequences with TranScripter has alerted me more than once to the co-occurring and close interweaving of individual utterances. Often the beginning of an utterance sets off when the previous one is not completely finished by the speaker. This process is particularly salient in the case of the separate coding of each speaker’s utterances, a phenomenon that produces overlappings even when they are not easily detectable in the stream of the conversation. The overlappings reveal themselves in the coding of the start and of the end of the individual turns as in the sample above where the bold type draws attention to the phenomenon. It is also possible to see the slight overlapping of the utterances in the vertical reading of the bars in Graphic 19.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>V</td>
<td>45.93s</td>
<td>48.89s</td>
<td>A wat muss ech da soen? [And what will I have to say? LLX]</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>46.21s</td>
<td>50.92s</td>
<td>Comment s'appelle ta soeur? (rather quick) [What is the name of your sister? FRENCH]</td>
</tr>
<tr>
<td>17</td>
<td>V</td>
<td>50.04s</td>
<td>50.90s</td>
<td>eh (almost inaudible)</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>50.88s</td>
<td>54.24s</td>
<td>Comment s'appelle ta soeur? so emol ... so ...! [What is the name of your sister? FRENCH say so ... say ... say it! LUX]</td>
</tr>
</tbody>
</table>

Graphic 19: Visualising the overlapping of the utterances.
In these ways we can read the distribution of the discourse among all the human and nonhuman members of the TEO team where each turn leans and builds on and against the preceding and even subsequent turn (Bouchard, 2004, Bakhtin, 1986). The overlappings of the utterances signal the intimate links between the actors in the speech event and are an illustration of Bakhtin’s notion of responsiveness as a precondition for communication and dialogue. Utterances are constructed while taking into account possible responsive reactions, for whose sake in essence they are actually created. The role of the others is not that of passive listeners, but of active participants in speech communication. As long as this responsiveness can be documented through overlappings in the chain of utterances, the quest for understanding is under way, as to some extent, primacy belongs to the response as the activating principle. Response prepares the ground for an active and engaged understanding. Understanding and response dialectically merge and mutually condition each other, one is impossible without the other (Bakhtin, 1981a). In this thesis I do not go deeper into the nature of the overlap, but just take it as a sign of the dynamics of the ongoing discourse, a dynamic that shows the TEO team members actively engaged in the quest for understanding by eagerly responding to others’ utterances.

Turns 15 to 18 above illustrate a real lived situation. Hence, the negotiation process has not yet come to an end, even in the face of the clear instruction given in Turn 18 by A who seems pretty confident in the procedure to follow: ‘What is the name of your sister? FRENCH say so … say … say it! LUX’. Despite an encouraging look from A who meets V’s searching eyes, V still does not feel confident enough to repeat the French structure. Her lack of confidence transpires in her constant playing with her hand and fingers at her throat and in a questioning look in the direction of A in Turn 22, as shown in Plate 20.
V’s corporeal behaviour at this stage shows that gestures reveal an individual’s inner order (Lantolf and Thorne, 2006). V’s various movements of the hands and fingers may indicate or even affect what she thinks and feels (Sennett, 2008). It looks as if V was strangling herself, both physically and mentally. Streeck (2008) has said that the continued production and repetition of a specific gesture such as that of V in Plate 20 demonstrate that a sequence of language production or of turns is not complete. Self-touching can also indicate that V is decreasing her active participation in the ongoing discourse and hence bring about a state of disengagement (Streeck, 2009). While V is putting her hand at her throat and keeps it there for the whole sequence leading up to the recording with TEO in Turn 37, F is fidgeting all through this episode in Turns 22-37 with his fingers as illustrated in Plate 21.
Streeck (2008, p. 52) comments on behaviour such as F’s in the following words: ‘Hands that are not engaged in deliberate activities can often be observed to be fidgeting, engaged in mutual play or play among the fingers of one hand. They thus sustain a state of perpetual perceptual and cognitive stimulation for themselves.’ All too often children in regular classroom are prevented from enacting behaviour like that of F. Maybe they are thus denied the opportunities for maintaining their engagement with the tasks to be achieved.

As the notion of ‘gesture’ is highly significant in the interpretation of the transcription and of the video stills, I will define my use of it by drawing on Kendon’s work.

### 7.4 The notion of gesture in the TEO team

For Kendon (2004) ‘gesture’ is the visible bodily action that plays a role in and is a constitutive part of an utterance. He also labels ‘gesture’ deliberate expressive actions that
tend to be under the guidance of the observed person’s voluntary control. Hence, gestures are accorded the status of actions for which the participants are responsible. Gesture is then a partner of speech in the utterance as finally constructed (Kendon, 2004). The terms ‘gesture’ or ‘gestures’ are not solely reserved for movements with the hands or the arms of the participants exchanging information but must encompass the whole spectrum of bodily behaviour. Gestures can combine with talk and other resources to form multimodal actions (Bolden, 2003, Streeck, 2009) based on movements and sounds or even the non-activities between them (Poyatos, 2002). It would be erroneous to try to isolate elements such as a cluster of voice features from the inherent visual features of the face and body and hence from the integrated body behaviour (Poyatos, 2002a). Gesturing, voice and intonation must be seen as an integrated whole in the analysis of the transcription.

In the analysis of the part of the discourse leading up to the emergence of TEO I can show the importance of gestures in the TEO activity by describing the turns as accompanied by gestures (hands, faces, voices, etc.) that occur in the TEO team. Gestures must be accepted as an integral part of the work with TEO. At the same time these gestures come to characterise V, F and A as they interrelate and influence each other in the language production process. Hence, I will show how gestures function within the immediate context of language production with TEO. Gestures will be examined in the concurrent and prior acts of co-participants within unfolding turns (Streeck, 2009). I continue the analysis of the transcription with some examples of gestures.
In the face of V’s physical and mental strain, A chooses a very kind soft voice in Turn 21 to invite her to work on the performance of her French utterance. But V resists her peer’s invitation by abruptly summoning A in Luxembourgish: ‘Say it yourself!’ Again V shows some physical discomfort when she backs off as if she was ducking for cover while making this utterance. A, however, keenly takes up V’s challenge even slightly before the end of V’s utterance and produces her own utterance in French: ‘What is the name of your …?’ This turn in the script of the story however does not satisfy the expert F. In Turn 24 he immediately challenges both partners by insisting in Luxembourgish that it is V’s job to complete the scheduled utterance: ‘No YOU should ask HER.’ These acts of resistance and contestation might be considered as indicators of effective functioning of the group, because divergent perspectives, opposition of ideas, resistance to communication and other disharmonious instances are an integral part of intersubjective functioning (Smolka et al., 1995). The confrontation between V, A and F is a good example of an interactional context that involves resistance and rhetorical opposition, which sometimes are the most productive way of developing the appropriation of cultural tools (Wertsch, 1998).

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
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</thead>
<tbody>
<tr>
<td>21</td>
<td>A</td>
<td>56.69s</td>
<td>57.88s</td>
<td>Vanessa!</td>
</tr>
<tr>
<td>22</td>
<td>V</td>
<td>57.84s</td>
<td>59.37s</td>
<td>Da so du!</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Say it yourself LUX]</td>
</tr>
<tr>
<td>23</td>
<td>A</td>
<td>59.25s</td>
<td>61.16s</td>
<td>Comment s'appelle ta …</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What is the name of your … FRENCH]</td>
</tr>
<tr>
<td>24</td>
<td>F</td>
<td>01.25s</td>
<td>64.48s</td>
<td>Nee DU sois HAT tøen.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[NO YOU should ask HER. LUX] (Insisting)</td>
</tr>
<tr>
<td>25</td>
<td>V</td>
<td>64.50s</td>
<td>65.41s</td>
<td>Co</td>
</tr>
<tr>
<td>26</td>
<td>F + A</td>
<td>65.32s</td>
<td>70.04s</td>
<td>Comment ... s'appelle ... ta soreur?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What ... is the name ... of your sister? FRENCH]</td>
</tr>
<tr>
<td>27</td>
<td>V</td>
<td>08.04s</td>
<td>71.51s</td>
<td>ta s... ta s...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[your s... your s... FRENCH]</td>
</tr>
<tr>
<td>28</td>
<td>F</td>
<td>71.46s</td>
<td>72.78s</td>
<td>soreur</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[sister FRENCH]</td>
</tr>
<tr>
<td>29</td>
<td>V</td>
<td>72.32s</td>
<td>74.61s</td>
<td>ssoeour oh freck!</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[sister FRENCH oh dear! LUX]</td>
</tr>
</tbody>
</table>
Plates 22 and 23 show that F’s utterance is accompanied by head movements, first in the direction of V on ‘YOU’ and then directed at A on ‘HER’; these gestures indicate the addressivity in the utterance. On ‘YOU’ F continues to nestle with his fingers in his lap before pointing with his left thumb into the direction of A on ‘HER’, thus using another body gesture for indicating the addressee.
The whole sequence is orchestrated by a ballet of gazes among the participants:
F > V, V > F > A > X > F, A > V, V <> F. This ballet of gazes is continued and apparently transformed into the immediate start of the production of an utterance in French. The gazes seem to bond the human actors together, as V immediately but hesitatingly and in a trembling voice starts saying ‘Co’, the first part of ‘Comment’. In the face of her difficulties F and A co-vocalise the partly delayed French utterance ‘What … is the name … of your sister?’ in Turn 26 by insisting with excessive intonation on the three parts of the utterance before being joined almost inaudibly by V in the final part of the utterance on ‘your s…’. The difficulties experienced by V with the pronunciation of the word ‘soeur’ (‘sister’) lead to an interruption in the group discourse signalled by V’s falling intonation pattern and by her turning away her head from her partners for a look into the open space below the
computer desk. V’s head, eye and finger movements can be seen in Plate 24. The ongoing fumbling with her fingers at her throat also shows her discomfort.

Intonation plays a very important role in the TEO team discourse as it is, according to Todorov (1984), the sound expression of social evaluation and hence will influence the future construction of utterances. V ends her utterance that began in Turn 27 in Turn 29 by lengthening the beginning of ‘sœur’ (‘sister’), which indicates a certain trouble with the task of completing the word. She adds a heartily felt ‘oh dear!’ in Luxembourgish, thus showing that she is overwhelmed by the task of producing such a difficult utterance.

Plate 24: V is looking away from her partners, thus signalling an interruption in the group discourse in Turn 29.

I continue with the analysis of the transcription before the appearance of TEO.
Totally unimpressed by V’s all too visible despair, A in Turn 30 literally jumps into V’s distressed utterance through slight overlapping and quickly offers a model of the utterance in French as if the production was just a matter of speed. A uses her right arm to touch V’s forearm in order to drag her into the continuation of the discourse. A’s behaviour is in opposition to many formal school situations in that it anchors the process of language development and learning into the corporeality and the sensuousness, the temporality and the social dynamism of the real people (Mannheim, 1985). Without A’s compassion for V in Turns 33 and 36 the learning and speaking process of the TEO team would probably be interrupted and it is possible to see in this interactive sequence that the dynamo, the power for any kind of learning is the feeling quality invested in it (Rosen and Rosen, 1973). A’s behaviour is illustrated in Plates 25a, 25b and 25c.
We now approach the place in the team discourse where TEO is not explicitly mentioned by name but is hinted at for the first time through its potential function in the construction process of the story.

7.5 A hint at TEO

Slightly overlapping and in immediate continuation of A’s movements and utterance, F hints for the first time at TEO in Turn 31. He does so in Luxembourgish by alluding to a possibility afforded by TEO in the team language production process: ‘Or … but you may also break it down into parts.’ It is interesting that F’s hesitant and neutral choice of words exemplified by ‘Or’ and ‘but you may’ is not indicative of his expert status, but on the contrary signals a status of ‘strategical indetermination’ (Pléty, 1998) that offers his contribution as a hypothesis or as a possibility for continuing the work (Lusetti, 2004).
V had already spoken the beginning of the total utterance suggested by A, but she seems all too glad to stop her performance at F’s proposal. Without any discussion, the procedure of splitting up the discourse into its grammatical parts is adopted by the three human actors in the TEO team. What we witness in Turns 30 to 36 does not only amount to a process of co-construction of language structures and of content in French. It corresponds at the same time to a savvy managing of the principle of cooperation in Luxembourgish (Rabatel, 2004). Discourse must not be reduced to a representationalist and informational vision of communication. All the turns that the children take and all the words that they use in combination with the ballet of gestures will influence the setting in which they act and speak in joint activities (Brassac, 2000). This connectedness of all the team members in the conversation allows for the emergence of the forms of French that will have to be mastered in the storying process with TEO as speakers complete each other’s remarks, modify them and develop further what the others say. Speakers ‘steal’ part of their grammar and vocabulary from the preceding discourse (Dufva, 1998).

An example of the connectedness and interdependence of all the team members can be detected in Turn 33: A suddenly changes her previous strategy of teaching V the correct French utterance by adopting F’s suggestion to split up the discourse into its parts. She turns her head to V and in Turn 33 simultaneously invites her to speak: ‘Say once (LUX) ‘Comment t’appelle’ … ‘Comment s’appelle’ (FRENCH)’. The slight slip of the tongue does not impede A’s rapid production of the correct first part of the utterance. After A finishes her utterance, F steps in and in a neutral tone in Turn 34 confirms the French structure to be reproduced by V who in Turn 35 asks with rising pitch: ‘What is the name? (FRENCH)’. In Turn 35 V comes across as if she was requiring authorisation for the next discursive step from her partners. Indeed, in Turn 36 V is immediately supported by A in a neutral tone devoid of any authoritative intonation: ‘Yes say it. (LUX)’. A says so while already looking at the screen in anticipation for the TEO recording to appear in the
storyline of the TEO software, as shown in Plate 26. During Turns 30 to 37, where she finally records the part ‘Comment s’appelle’, V is nestling at her throat, thus revealing a bit of hesitation and uncertainty when producing the utterance.

Turns 7 to 37 take about 70 seconds and lead to V’s recording of only a fragment of a sentence. Plate 27 shows V as she is opening her eyes wide, then smiling all over her face, while all three children are looking back at the screen after F and A had diverted their attention from it.
Plate 27: The TEO software captures the attention of the human actors in Turn 37.

In Turn 37 V uses a strong and neutral voice for the recording of ‘What is the name’ with all of the three human actors turning to the screen during V’s utterance. The use of TEO by V focuses the attention of the three children and leads to a re-structuring of the human actors’ interaction. The TEO software and V’s encapsulated human utterance become the objects of the children’s joint attention. The pupils are not speaking face to face bridging some sort of information gap, but they are now working side by side, with a joint focus of activity, the object, i.e. the computer screen with the software, becoming another interlocutor of sorts (Van Lier, 2002). Hence, it is appropriate to define the TEO tool as a nonhuman actor in the network of language production. TEO acts differently from the human actors as it allows them to continue with their discourse by allowing them to split up individual utterances, a procedure that is not permitted in everyday language and that would certainly result in the collapse of the ongoing dialogue or lead to the despise of
the person resorting to such a strategy. It is possible to see in the transcription of Turns 30 to 37 that TEO as a nonhuman actor possesses qualities for transforming the discourse of the TEO team and hence also of its human actors. We find evidence for this in the transformation of the planned utterance ‘Comment s’appelle ta soeur? [What is the name of your sister? FRENCH]’ that has been proposed by A into a truncated version of ‘Comment s’appelle? [What is the name?]’, which is approved by A and F. At the same time TEO activates the language production sequence as V is propelled into the uttering and recording of part of an intended sentence that she is not yet able to produce in totality. These affordances of TEO are made visible on the screen with the help of individualised icons that establish TEO as an actor participating in the construction of the planned discourse. Human and nonhuman actors then seem to take part equally in the construction and performance of the French language learning sequence, thus constituting the TEO language production team where the properties of each member can circulate and contribute to changes in Luxembourghish and French. The transformations of the discourse can be traced in the transcription that I have analysed so far. I will now turn to the nonhuman actor TEO in order to come closer to its detailed roles and functions in the learning process of oral French. The TEO tool can be traced in the transcription, on the stills from the videotape and on the graphical display of TranScripter. I will use these representations for discussing the emergence of the nonhuman actor TEO in the graphically visible discursive space of the TEO team.

7.6 The emergence of the nonhuman actor TEO in the graphically visible discursive space of the TEO team

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>TEO</td>
<td>90.66s</td>
<td>93.72s</td>
<td>Comment s'appelle?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What is the name? FRENCH]</td>
</tr>
</tbody>
</table>
Turn 38 transcribes the emergence of the TEO tool on the graphical and visual display of TranScripter as can be seen in Graphic 28.

On the stills the emergence of TEO is signalled and accompanied by nonverbal behaviours such as
- V’s wide open eyes,
- V’s beaming smile on her face,
- V’s nestling with her fingers at her throat,
- A’s concentrated look at the screen and at the TEO software and
- F’s floating look across the room and his fidgeting with his fingers, as shown in Plate 29.
Plate 29 clearly indicates that speech, gaze and gestures with eyes, hands and postures are combined in a robust tri-modal construction (Streeck, 2009) where the verbal code in interaction and communication is not necessarily the prevalent code. The human actors in Plate 29 embody the communicative language production through their corporeal behaviour while the nonhuman actor TEO represents the verbal code through its replaying of V’s recorded utterance. Speech, gaze and gestures must be accounted for through their temporal location along the encounter, the intensity with which they occur, and their duration (Poyatos, 2002). They inevitably are interpreted differently by the various partners in the discourse. The nonverbal behaviours can confirm the verbal communication by supporting it visually, duplicate the message by repeating it, emphasise it by intensifying it, weaken its credibility or contradict it by intonation or hesitation, or even mask it by pretending indifference in case of anxiety (Poyatos, 2002). Facial movements, especially
eye movements, but also all other visual changes within interactive events, must be regarded as true gestures, because they coincide, alternate with, or replace verbal language (Poyatos, 2002). The transcription and the video still in Plate 29 suggest that the participants in the French language learning process are affected by each other’s unique utterances not through their words alone, but also through the emotional displays of audible and visual cues in their complex bodily behaviour (Poyatos, 2002).

What exactly - in the emergence of the voice of the nonhuman actor TEO - is making French language learning the rewarding experience for V that looks as if it was written into the beaming smile on her face? Why are all three human actors so concentrated while looking at the screen and waiting for the utterance to show up visually and audibly? Why is there so much excitement and contentment on V’s side as she listens to her own voice now encapsulated in a software and represented by an icon on the screen? This highly motivated attitude of the human actors is all the more surprising as TEO, in Turn 38, just replays the part of the utterance that V has recorded: ‘Comment s’appelle? [What is the name? FRENCH]’. This utterance is only a part of the bigger projected utterance that will refer to one member of the family of one of the children within the frame of her story. For the moment the following properties afforded by the TEO tool are potent enough to validate even fragmentary discourse in the eyes and ears of the human actors: with TEO it becomes possible

a) to split up discourse into its constituent parts,

b) to record each part individually and,

c) to re-compose the entire discourse when re-playing its parts in a continuous sequence.
Examples:

a) splitting up an utterance into two separate utterances:

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>A</td>
<td>74.34s</td>
<td>76.38s</td>
<td>Comment s'appelle ta soeur?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What is the name of your sister? FRENCH] (quick)</td>
</tr>
<tr>
<td>31</td>
<td>F</td>
<td>76.03s</td>
<td>79.47s</td>
<td>Oder ... du kanns et awer och stakerweis sonen.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Or ... but you may also break it down into parts. LUX]</td>
</tr>
</tbody>
</table>

34 F 82.85s 85.00s Comment s'appelle?  [What is the name? FRENCH] (falling pitch)

35 V 85.01s 86.29s Comment s'appelle?  [What is the name? FRENCH] (rising pitch)

54 F 120.17s 122.81s Eh Pardon ... Ta soeur.  [Eh Sorry LF ... Ta soeur. FRENCH]

55 V 122.17s 124.73s Ta soeur? (tentative)  [Your sister? FRENCH]

56 F 124.02s 125.03s Ehe (confirming)  [Your sister! FRENCH]

57 A 124.38s 125.30s Ta soeur! (assertive)  [Your sister! FRENCH]

b) recording the two parts of the utterance:

37 V 88.13s 90.77s recording with TEO:  Comment s'appelle?  [What is the name? FRENCH]

58 V 125.62s 128.43s recording with TEO:  Ta soeur.  [Your sister. FRENCH]

c) recomposing separated parts of an utterance into a whole utterance (1)
or separated utterances into a whole stretch of discourse (2)
These procedures of splitting up, recording and recomposing are effective in the maintenance of the ongoing discourse even as they are separated by many intermediary turns and discourse off the task.

The specific procedures afforded by TEO had neither been in the software designer’s nor in the TEO project leader’s mind. Instead, they were discovered and instantiated by children in most of the classrooms that put TEO to use in their language learning. Similar
strategies for breaking up discourse have been shown to operate in deaf children’s
‘breaking-gestures-into-parts’ strategy when they were frustrated at the results of their
gestural discourse patterns (Goldin-Meadow, 2005). The fact that humans resort to such
strategies of re-ordering and re-structuring is a paramount example of human cleverness
that ‘shows itself in our ability to actively structure and operate upon our environment so
as to simplify our problem-solving tasks patterns’ (Clark, 1997, p. 67). Humans working
with artefacts or technologies transform these and change the way they use them through
a process of reflection. They go beyond what the designers had envisioned and cast tools
as mediators in new activities (Kaptelinin and Nardi, 2006). The situated practice of
recording stories with TEO enabled the children to profit from the opportunity afforded by
the TEO tool to record only parts of an utterance and to paste these parts together in the
end by re-playing them continuously. In doing so the children have intuitively recruited a
partner in the construction process of their utterances, a nonhuman actor at that. The
problem of constructing the French utterances was divided between the human and
nonhuman actors so that the human actors could deal with a tractable problem. In the
TEO team, work can be distributed in social arrangements between human and nonhuman
actors so that novices can profit from the social relations and structures among all actors
in order to organise and perform their activities (Hutchins, 1996), in our case the
production and learning of French.

I will now follow the three human actors and the nonhuman actor TEO on their way
from TEO’s first appearance in Turn 38 to its next and second emergence in Turn 51, as
shown in Graphic 30.
After the TEO appearance in Turn 38 there are six turns (39-44) in Luxembourgish:

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start</th>
<th>End</th>
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</tr>
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<tbody>
<tr>
<td>38</td>
<td>TEO</td>
<td>90.66s</td>
<td>93.72s</td>
<td>Comment d'appelle?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What is the name? FRENCH]</td>
</tr>
<tr>
<td>39</td>
<td>V</td>
<td>93.88s</td>
<td>95.09s</td>
<td>As dat scho besser?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Is this row better? LUX]</td>
</tr>
<tr>
<td>40</td>
<td>A</td>
<td>95.20s</td>
<td>96.59s</td>
<td>Wo e Männchen heis de?)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[What picture do you choose? LUX]</td>
</tr>
<tr>
<td>41</td>
<td>V</td>
<td>96.68s</td>
<td>100.57s</td>
<td>Eh...is</td>
</tr>
<tr>
<td>42</td>
<td>F</td>
<td>99.73s</td>
<td>102.35s</td>
<td>Oh née ach woll deen do.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Oh no I would like that one, LUX]</td>
</tr>
<tr>
<td>43</td>
<td>A</td>
<td>102.23s</td>
<td>105.80s</td>
<td>Du bass náscht mat du wees dat jo. (whispering)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[You are not participating, you know that LUX]</td>
</tr>
<tr>
<td>44</td>
<td>F</td>
<td>104.04s</td>
<td>105.73s</td>
<td>Aaah jo.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Aaaah yes. LUX] (laughing)</td>
</tr>
</tbody>
</table>

Turn 39 by V in Luxembourgish: ‘Is this now better?’ is asked in a neutral tone. As V’s voice is objectified in the nonhuman actor TEO, the re-play may have encouraged the auto-evaluative attitude of V. But F is not attending to V’s utterance, as shown by his turning away from her. A is already focused on the icon appearing on the screen and chooses not to respond to V. V’s bid for evaluative feedback thus remains unnoticed and could even be considered as a rhetoric question as V’s intonation and behaviour signal that she seems quite satisfied with her personal production.
After the human actors’ listening to TEO re-playing V’s utterance, Turns 40-44 result in a fast and dynamic discourse production in Luxembourgish about the choice of the personalised icon for the recording. As F bids for his personal choice, he is reminded by a whispering A in Luxembourgish in Turn 43: ‘You are not participating, you know that.’ Laughingly F is acknowledging in Turn 44: ‘Aaah yes. LUX’. In such a way the human participants reveal an implicit and tacit understanding of the rules governing the French learning process. The good humour seems to bond the human actors together and hence to regulate the French language learning, maybe by providing team members with time to reflect (Ohta, 2000). The disposition to engage with the French language is there, as shown in the next section of the transcription:

<table>
<thead>
<tr>
<th>45</th>
<th>A</th>
<th>105.49s</th>
<th>107.05s</th>
<th>[Your (Te) brother. FRENCH]</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>F</td>
<td>106.44s</td>
<td>108.26s</td>
<td>[Or I could also ... LUX]</td>
</tr>
<tr>
<td>47</td>
<td>V</td>
<td>106.94s</td>
<td>108.64s</td>
<td>[Your (Te) brother. FRENCH]</td>
</tr>
<tr>
<td>48</td>
<td>F</td>
<td>108.32s</td>
<td>109.86s</td>
<td>[Your (Te) brother. FRENCH]</td>
</tr>
<tr>
<td>49</td>
<td>V</td>
<td>109.86s</td>
<td>111.15s</td>
<td>[Your (Ton) brother! FRENCH]</td>
</tr>
<tr>
<td>50</td>
<td>V</td>
<td>111.85s</td>
<td>113.79s</td>
<td>[Your (Ton) brother. FRENCH]</td>
</tr>
<tr>
<td>51</td>
<td>TEO</td>
<td>114.45s</td>
<td>116.50s</td>
<td>[Your (Ton) brother. FRENCH]</td>
</tr>
<tr>
<td>52</td>
<td>F</td>
<td>116.08s</td>
<td>117.04s</td>
<td>[Wrong! LUX]</td>
</tr>
</tbody>
</table>

In Turn 45 and slightly overlapping with F’s laughter, A feels confident to suggest, although in a tentative way, the part of the utterance that should be recorded next: ‘Ta frère [Your (Ta) brother. FRENCH]’. A uses the wrong pronoun, feminine instead of masculine, linked to the noun ‘brother’ in French. This seems to be instinctively recognised by V as she follows A hesitantly and produces a curious mixture of the French words ‘ton’ and ‘ta’ by uttering ‘te’ in Turn 47: ‘Te frère? [Your brother? FRENCH]’. The rising
intonation at the end of her utterance signals a questioning of A’s contribution. F, who is continuously participating in this dynamic stretch of discourse, immediately suggests the correct French version in a detached neutral but insisting tone in Turn 48: ‘Ton frère. [Your brother. FRENCH].’ In Turn 49 V picks up on F’s proposal and in an assertive way repeats F’s contribution, insisting on each word by separating them with a short pause.

Turns 45, 47, 48, 49 all minimally overlap, thus revealing the dynamically interrelated utterances relative to the clarification of the correct French pronoun. In total confidence V sets out to record the two words in a very authoritative tone in Turn 50. The automatic replay of this utterance by TEO in Turn 51 is interwoven in the last part with the next Turn 52 from F who cannot refrain from interjecting in a rather authoritarian manner revealed by his emotionless tone: ‘Wrong! LUX’.

TEO emerges for the second time in Turn 51 in the team language production process when replaying V’s partial sentence. The replay of V’s two-word utterance underscores V’s production by highlighting it at a safe distance from its point of utterance in Turn 50. V’s utterance becomes salient and in a certain way much more audible than through V’s mouth. This process objectifies V’s utterance by dissociating it from its physical human support and by displacing and dislocating it graphically and orally into the production sphere of the nonhuman actor TEO. Now V can be held doubly accountable for her utterance, in a direct way and in an indirect way, an occasion that is not missed by the expert F.

I will now discuss in more detail the role of replay in the language production process of the TEO team, a discussion that will allow me to identify TEO as a tool for replay, repair and accountability.
7.6.1 TEO as a tool for replay, repair and accountability

In the TEO team the nonhuman actor TEO achieves accountability for the language produced by offering immediate replay of each recorded utterance and by creating the possibility for repair, as we will see below. The TEO replay helps to organise an environment of language production and learning where the utterances recorded are detectable, countable, reportable, tell-a-story-aboutable, analysable – in short, accountable (Garfinkel, 1967). In effect, TEO makes for a multiplication of reality (Mol, 2002). The double articulation of a recorded utterance through its human producer and immediately after through the TEO replay constitutes a powerful, double instance of monitoring, especially for the meta-linguistic element of language (Harris, 1996). Examples can be found below.

| 38 | TEO | 90.66s | 93.72s | Comment s'appelle? [What is the name? FRENCH] |
| 39 | V   | 93.68s | 95.09s | As das schon besser? [Is this now better? LUX] |
| 50 | V   | 111.65s | 113.79s | recording with TEO: Ton frère. [Your (Ton) brother, FRENCH] |
| 51 | TEO | 114.45s | 116.50s | Ton frère. [Your (Ton) brother, FRENCH] |
| 52 | F   | 116.08s | 117.04s | Falsch! [Wrong! LUX] |
| 58 | V   | 125.62s | 128.43s | recording with TEO: Ta soeur. [Your sister, FRENCH] |
| 59 | TEO | 128.44s | 130.56s | Ta soeur. [Your sister, FRENCH] |
| 60 | V   | 130.13s | 132.66s | As dat f...? ... rontag? [Is that wr...? ... correct? LUX] |
| 61 | F   | 131.91s | 134.29s | Jo ... e bessen. Jo! [Yes ... a little bit. Yes! LUX] |
| 62 | A   | 134.25s | 135.47s | Jo. [Yes. LUX] |
The partners in the discourse may legitimately be called on to provide an explanation or rationale for their discursive actions. The TEO replay functionality favours multiple paths spiralling around a problem and offers the sort of cognitive flexibility authentic learning requires. The human actors can come close to expert performance through a series of successive approximations and comparisons that can be detected in the transcription below.

Apart from immediate replay TEO affords temporal flexibility for the learners through abstracted replay – the opportunity for learners to view and hear important episodes of their problem solving as many times as they need to (Petraglia, 1998). I give one example from a later part of the transcription:
In the two transcriptions above a web of interactions is created through original contributions as well as through replays by TEO. These contributions of the human and nonhuman actors in the TEO team index, respond to, build on, and take up each other in order to construct new meanings in the discourse and in the French language learning process (Stahl, 2006). Everyone’s work becomes visible and objectified in the performance of the activity by means of the TEO replay and hence can and must be accounted for. In the TEO team this accountability exists within the bounds of the TEO community and its values that are reflected in the storying process. In the total transcription there is but one instance of individual competitiveness that results in momentary withdrawal of one member of the TEO team from the language learning process. Whenever there are signs and marks of bad temper, these are overcome by the dynamics of the ongoing team production process as can be detected in Turns 51-58.

However, in the one instance outlined below, F and V deliberately compete about their relative competences in French. V originally intends to record an utterance featuring her brother’s name ‘Misha’ that is not accepted by F who proposes the French name ‘Michel’ instead in Turn 231. In Turn 232 A then joins with F’s proposal and repeats F’s utterance. However, V ignores A’s contribution and vehemently opposes F’s proposal by declaring in Turn 233 that F does not know anything about the situation, probably referring to the correct name of her brother. V’s protest is misinterpreted by F in Turn 234 where he vigorously tries to re-establish his authority by insisting on his superior abilities in the target language French. In Turn 235 V then offers a compromise by proposing to record the utterance in parts, a proposal that meets A’s approval in Turn 236. The individual competitiveness between F and V appears to be resolved by F’s behaviour in Turn 237.
where he first agrees with a neutral intonation to V’s suggestion of recording in parts and where he then states that he will not help with such a presumably dilettante procedure. The competitive behaviour finally dissolves when V continues with the partial recording, supported by A in Turns 238-240. It is finally the team’s effort of storying that prevails through their recording performance and that is accounted for in the TEO team: ‘Although directions are explicit and the work of individuals is visible, like any good team with a collective sense of purpose, the accountability focuses largely on the effectiveness of the ensemble’ (Landay, 2004, p. 120).

Through the function of replay and by soliciting immediate repair TEO fulfils Actor-Network-Theory’s requirements for being defined as an actor: an actor has to make a difference and is not substitutable for anyone else. An actor uniquely does things and hence makes a difference (Latour, 2005).
TEO certainly makes a difference in the ongoing discourse and language learning sequence in the transcriptions above by replaying and offering V’s recorded utterances for close inspection by herself and by the other partners in the storying process. TEO then qualifies as a fully-fledged actor along with the human actors in the language production process of eventful stories. We are in the presence of a phenomenon where the pupils open up the artefact TEO to new and potentially more complex uses while they use and reuse TEO as a mediational means (Scollon, 2001).

In Graphic 31 and in the next part of the transcription I will show how the repair is instantiated by the action of TEO and how the repair discourse will result in a new appearance of TEO in Turn 59.

![Graphic 31: Repair discourse resulting in a new appearance of TEO in Turn 59](image)

The repair process of the discourse replayed by TEO in Turn 51 and evaluated as wrong by F in Turn 52 begins in Turn 54. After formulating a sort of excuse for intruding into V’s utterance, F proposes the utterance ‘Your sister’ in a neutral and almost disinterested tone. In between and in Turn 53, A had tentatively played with the French word ‘frère’ [brother FRENCH], switching in an assertive way from ‘frère’ to ‘fère’ (maybe a reference to the homonym ‘faire’ [to make FRENCH]) and back to ‘frère’. Even as F’s
repair is put forward in a rather distant tone, his utterance comes to be immediately
imitated by V in Turn 55, albeit in a very hesitating and even doubting way.

V is probably doubtful of her ability to correctly reproduce the sound of this rather
strange cluster of vocals in a French word. She expresses her doubts by lengthening the
beginning of ‘soeur’, thus transforming it into ‘ssoeur’. While she is speaking the last part
of her utterance, a light tremor appears in her voice. At the same time V turns her head
into the direction of F, probably looking for approval, as shown in Plate 32.
As the graphical display and the transcription show, Turns 54, 55, 56 and 57 slightly overlap. This is indicative of the dynamics of the repair process instantiated by the replay of V’s utterance in Turn 51.

<p>| | | | | | |</p>
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</thead>
<tbody>
<tr>
<td>54</td>
<td>F</td>
<td>120.17s</td>
<td>122.81s</td>
<td>Eh Pardon … Ta soeur.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Eh Sorry LUXFRENCH … Ta soeur. FRENCH]</td>
</tr>
<tr>
<td>55</td>
<td>V</td>
<td>122.17s</td>
<td>124.73s</td>
<td>Ta soeur? (tentative)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Your ssister? FRENCH]</td>
</tr>
<tr>
<td>56</td>
<td>F</td>
<td>124.02s</td>
<td>125.03s</td>
<td>Ehe (confirming)</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>A</td>
<td>124.36s</td>
<td>125.30s</td>
<td>Ta soeur! (assertive)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Your sister! FRENCH]</td>
</tr>
</tbody>
</table>

F clearly endorses V’s imitation, repetition and slight transformation of ‘Your sister’ (remember the change into ‘ssister’) before she has even finished her utterance in Turn 56 with a confirming ‘Ehe’, meaning ‘yes’ in Luxembourgish. At the same time A has joined both partners already in Turn 57 with an assertive ‘Ta soeur! [Your sister! FRENCH]’ that is articulated just before the end of F’s ‘Ehe’. After the end of her utterance A looks intensely in V’s direction, leans her body slightly towards her and points with her right hand in her direction, inviting her to record the utterance. A’s body behaviour is immediately noticed and transposed into action by V, as she has already turned her head into the direction of the screen for manipulating the recording software, as can be seen in Plate 33.
In Turn 58 V records in a rather cheerful way the utterance that completes the first part recorded earlier: ‘Ta soeur. [Your sister. FRENCH]’. TEO repeats the utterance in Turn 59. Even before the end of the contribution of TEO, V resorts to an evaluative stance and asks in Turn 60: ‘As dat f…? … richteg? [Is that wr…? … correct?’ LUX]. The slight slip of a tongue at the beginning of the utterance signals a disposition on V’s part to question her own ability to produce correct utterances in French. As she continues to nestle at her collar and her throat with her left hand and fingers (this corporeal behaviour has not been interrupted since Turn 16), V turns her head to the left and looks for the expert F. F’s evaluative response in Turn 61 is as ambivalent as V’s original question in Turn 60: ‘Jo … e bessen. Jo! [Yes … a little bit. Yes! LUX]. F first approves of V’s performance, but then opts for a more relativistic and cautious judgment before resorting to a final and firm
encouragement. In Turn 62 A closes the evaluative process by also gently endorsing V’s utterance and performance.

Once again the double articulation of the utterance ‘Your sister’ in FRENCH by the recording of V and by the replay of TEO is a situated practice where the creation of knowledge is essentially a matter of learning to argue, to auto-evaluate, to evaluate and eventually to repair the collective production. A technology like TEO will never replace the need for learners to participate in ongoing conversations with partners sharing interests and commitments. TEO should not be seen as replacing such communication but rather as providing a resource for supporting it (Säljö, 1999). From the above it becomes clear that TEO is such a resource and even more than that: TEO is a nonhuman actor in Latour’s sense in the collective performing, producing and learning of the French target language.

Before analysing further examples of split up discourse and repair in the transcription, I will discuss an important point in the French language production process in the TEO team, which is apparent in the transcription sequence above in Turns 45-62: the imitation of language patterns and language structures by all the human and nonhuman actors.

7.6.2 TEO as a tool for imitation
The phenomenon of imitation can easily be detected in the graphic display of the sequence initiated by A in Turn 45: ‘Ta frère. [Your (Ta) brother. FRENCH]’, if one is aware that the whole learning sequence in French represents an imitation process involving just four words. In Graphic 34 cascades of utterances reveal themselves in a ladder-like fashion as if each contribution served as a necessary rung for the next one.

With the exception of Turn 46 by F, Turns 45, 47, 48, 49, 50, 51 and 53 all refer to the two French words ‘ton’ and ‘frère’, while 54, 55, 57, 58 and 59 concern the words ‘ta’ and ‘sœur’ representing the same grammatical structure or combination ‘pronoun and noun’. In Turns 45-62 the learning episode is directed at V who does the recording ‘Ton frère. [Your brother. FRENCH]’ in Turn 50 and ‘Ta sœur. [Your sister. FRENCH]’ in Turn 58.
TEO replays the recorded utterance in Turns 51 and 59 respectively. This particular imitative process is qualitatively very different from what happens when the children imitate each other. This is so, because the imitation through TEO duplicates and hence reinforces the performance of V. V’s effort becomes much more remarkable and sparks off an evaluation process as shown above and leads into a very differentiated imitative
procedure that I will explain below. Statistically, in this sequence of imitations in Turns 45-62, the French language is used twice as many times as the Luxembourgish one: there are 12 turns in French versus 6 turns in Luxembourgish. It is the targeted learner of the French language V who is the most active in the learning process (13.22s) while experimenting with the language forms and structures being acquired through the discussion and mediation in Luxembourgish. The activity in this episode seems to be well distributed among all the members of the team with F as the expert taking a slight advantage in the modelling process (10.34s vs. A’s 6.67s).

The distribution between Luxembourgish and French is even more interesting in the transcription section under analysis. Again it is V as the targeted learner of French who speaks the most French and who practises the language elements and structures much more than the other two human participants. V performs French for much more than double the time of A and F each (V’s 10.69s vs. A’s 4.20s and F’s 4.18s). This situation is quite different from normal classroom discourse where the experts tend to outscore those in need of practice and of time for speech.

In Luxembourgish the ratio is reversed, as F (5.16s) speaks double the amount of either V (2.53s) or A (2.94s). Moreover, this is only incidental talk that is not requiring the group to imitate. It is clear that F is leading the activity in French by providing the models that have to be emulated by the other two participants. F insists in Turn 48: ‘Ton frère. [Your brother. FRENCH]’ and in Turn 54: ‘Ta sœur. [Your sister. FRENCH]’. But A also feels comfortable with participating in the modelling of the utterances, tentatively and mistakenly in Turn 45: ‘Ta frère. [Your (ta) brother. FRENCH]’, assertive and correct in Turn 57: ‘Ta sœur. [Your sister. FRENCH]’.

By focusing their learning processes and their organisation on the individual learner, regular classrooms all too often fail to capitalise on cooperation as shown below in the
transcription of the imitative process. However, the child upon entering school for the first
time is by no means a novice in regard to joint actions, but an expert in personal
communication, imitation and play (Elkonin, 1972). The imitation process is a very
complex learning experience that is further complicated by the incorporation and
participation of the nonhuman actor TEO.

In their multiple activities children analyse and imitate the behaviour and linguistic
performance of the surrounding adults or peers. At the same time a good deal of linguistic
development emerges when children engage in the analysis of their own linguistic
production (Elbers, 1995, Lantolf and Thorne, 2006). TEO provides an additional
possibility for analysis of one's own language production with all its subtleties, nuances
and intonations. Turns 58, 59 and 60 provide an example of such an analysis as V
produces 'Ta soeur' and records it. TEO replays the utterance and V – after analysis of her
own performance in French – doubts and subsequently questions her partners in Turn 60:
'Is that wr...? ... correct? LUX'.

The replay with TEO offers an alternate opportunity for self-analysis as the re-
immersion into the group discourse is delayed and additional time for thinking and
reflecting is given. The learner's self-analysis takes advantage not only of the structure of
the storying process, but also of the scaffolding of the story and of the French language
material through the mediation of Luxembourgish. Thus, the whole imitative process in the
TEO team is not a simple mechanical parroting but presupposes some understanding of
the structural relations in a problem that is being solved (Vygotsky, 1987, Chaiklin, 2003).
The essence of this imitative activity is its transformative nature, which makes sure that there will be a development in the language competences of the learners. Imitation is always an intentional and self-selective behaviour on the child’s part; it is not driven by frequency of exemplars (Tomasello, 2003). Children can be said to imitate what they are in the process of learning (Bloom et al., 1974). Earlier in the transcription, in Turns 26 to 31, V was neither able to imitate the general sentence structure ‘What … is the name … of your sister? FRENCH’ nor the particular word ‘soeur (sister FRENCH)’. Her inability to imitate was evidenced by her utterance ‘sssister FRENCH oh dear! LUX’ when she exceedingly lengthened the initial ‘s’ of ‘soeur’, thus signifying and bemoaning its enormous difficulty. The lengthening itself can be considered as playing with the timbre of the word ‘soeur’, play that contrasts with regular school situations where pupils are usually expected to conform to a standard in forms of expression. Regular educational settings all too often imply ‘sounding the same’ and approximating the standards of the educated speaker (Van Lier, 2004). In contrast to standardised forms, V’s sounding is tentative, intimate and ultimately creative. By engaging into the sound production of ‘your s… your s…’ in Turn 27 and of ‘sssister’ in Turn 29, V showed at that point in the activity that she wanted to enter into the discourse by bringing in her own accentuation (Voloshinov, 1973). Ultimately V’s failure to complete the utterance, hence the failure of her imitation procedure, led to F’s proposition to break the utterance down into manageable parts in Turn 31. The transcription is shown below.
This example illustrates a process of imitation that does not lie, for the time being, in V's zone of proximal development. V shows only a limited potential for imitation, a situation that is detrimental to the development of her language competences. It is particularly fascinating to see that only some fifty seconds later in the interaction V comes to produce the word ‘soeur’ correctly because the whole process of communication, of splitting up of the discourse, of re-arranging the task, of replay and of alternate imitation allowed her to continue to perform as a learner. V's learning process then supports Speidel's (1989) view that imitation can follow immediately after and entail role repetition of the model, or that it can be delayed and result in reduced or expanded versions of the model.

The transcription shows that in varying degrees the knowledgeable expert F as well as the empathetic partner A relate to the targeted learner of the French language V exactly in the same way as the adult experts mentioned above. The imitation process with the nonhuman actor TEO replaying the human actors' utterances on call and under control of the children is a sophisticated sign of the development of understanding and of maturing intellectual and psychological functions. For Vygotsky (1987, p. 210) 'development based on collaboration and imitation is the source of all the specifically human characteristics of consciousness that develop in the child.' Imitation qualifies as development if it is organised in such a way that something new is created out of saying or doing the same thing (Newman and Holzman, 1993). The sequence below shows the creation of
something completely new out of repeating and imitating the same words and structures over a stretch of about thirty seconds and amongst the actors of the TEO team.

The evaluative turns in Luxembourghish, i.e. Turns 46, 52, 56, have been omitted in order to accentuate the trajectory from ‘Ta frère’ (A) to ‘Te frère’ (V) to ‘Ton frère’ (F, V, V, TEO) to ‘Frère not F(r)ère’ (A) and towards the transformation of the word but not of the grammatical structure into ‘Ta soeur’ (F, V, A, V, TEO). I have put the individual speakers of each transformational segment within parentheses in order to emphasise the participative effort.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Speaker</th>
<th>Time Start</th>
<th>Time End</th>
<th>Phrase (Language)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>A</td>
<td>105.49s</td>
<td>107.05s</td>
<td>Ta frère. (tentative) [Your (Ta) brother. FRENCH]</td>
</tr>
<tr>
<td>47</td>
<td>V</td>
<td>106.94s</td>
<td>108.64s</td>
<td>Te frère? (hesitant) [Your (Te) brother? FRENCH]</td>
</tr>
<tr>
<td>48</td>
<td>F</td>
<td>108.32s</td>
<td>109.86s</td>
<td>Ton frère! (insisting) [Your (Ton) brother! FRENCH]</td>
</tr>
<tr>
<td>49</td>
<td>V</td>
<td>109.68s</td>
<td>111.15s</td>
<td>Ton frère. (affirmative, assertive) [Your (Ton) brother. FRENCH]</td>
</tr>
<tr>
<td>Turn</td>
<td>Actor</td>
<td>Time (s)</td>
<td>Time (s)</td>
<td>Notes</td>
</tr>
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<td>------</td>
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<td>----------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>50</td>
<td>V</td>
<td>111.65</td>
<td>113.79</td>
<td>recording with TEO: Ton frère. [You (Ton) brother. FRENCH]</td>
</tr>
<tr>
<td>51</td>
<td>TEO</td>
<td>114.45</td>
<td>116.50</td>
<td>Ton frère. [You (Ton) brother. FRENCH]</td>
</tr>
<tr>
<td>53</td>
<td>A</td>
<td>117.41</td>
<td>120.85</td>
<td>Frère net F(r)ère ... Frère (assertive, tentative) [FRère F not L F(r)ère ... Frère. FRENCH]</td>
</tr>
<tr>
<td>54</td>
<td>F</td>
<td>120.17</td>
<td>122.81</td>
<td>Eh Pardon ... Ta soeur. [Eh Sorry LF ... Your sister. FRENCH]</td>
</tr>
<tr>
<td>55</td>
<td>V</td>
<td>122.17</td>
<td>124.73</td>
<td>Ta soeur? (tentative) [Your sister? FRENCH]</td>
</tr>
<tr>
<td>57</td>
<td>A</td>
<td>124.38</td>
<td>125.30</td>
<td>Ta soeur! (assertive) [Your sister! FRENCH]</td>
</tr>
<tr>
<td>58</td>
<td>V</td>
<td>125.62</td>
<td>128.43</td>
<td>recording with TEO: Ta soeur. [Your sister. FRENCH]</td>
</tr>
<tr>
<td>59</td>
<td>TEO</td>
<td>128.44</td>
<td>130.56</td>
<td>Ta soeur. [Your sister. FRENCH]</td>
</tr>
<tr>
<td>60</td>
<td>V</td>
<td>130.13</td>
<td>132.66</td>
<td>As dat f...? ... richteg? [Is that wr...? ... correct? LUX]</td>
</tr>
<tr>
<td>61</td>
<td>F</td>
<td>131.91</td>
<td>134.29</td>
<td>Jo ... e bessen. Jo! [Yes ... a little bit. Yes! LUX]</td>
</tr>
<tr>
<td>62</td>
<td>A</td>
<td>134.25</td>
<td>135.47</td>
<td>Jo. [Yes. LUX]</td>
</tr>
</tbody>
</table>

Turns 60, 61, 62 are significant in relation to the high level of consciousness necessarily involved in real learning processes. The process of imitation in the TEO team leads to an extremely differentiated evaluation of the result by all three human actors. V articulates a certain hesitancy concerning the outcome of her performance in Turn 60: ‘Is that wr...? ... correct? LUX’. After a rather sceptical judgment in Turn 61: ‘Yes ... a little bit. LUX’, the expert F finally decides to agree with V’s production. At almost the same time A indorses F’s decision in Turn 62. The provisional character of these evaluations and statements indicates that for the human actors involved there may always be a time and a space for improvement in the learning of the French words and structures. The potential for the development of oral language skills is then unlimited. In the exchange, the greatest emphasis is put on the value, not on the amount, of the information for the human actors.
constructing their learning experience. The TEO team members convert external
conditions selectively into activity and achieve their objectives by evaluating something in
the performance (Fichtner, 1999).

For the TEO team members language learning is an unfinalised process. By engaging
in the continuous dialogic practice of responding to and addressing others, they learn and
re-learn that they are learners through the organised contradictoriness in the TEO team
(Newman and Holzman, 1993). This contradictoriness may be temporarily solved as
happens in Turns 60-62, but it nevertheless leads the whole language production activity
and enhances the potential for human agency. The TEO team members constantly
interpret and imitate and transform the utterances of others, not abstract sentences, but
lived utterances because these are imbued with communicative and other intentions of
other users (Lantolf and Thorne, 2006). Within the storying process embodied in the
transcription these intentions relate to the family members of their own community. The
discourse sequence transcribed above qualifies utterances as motors of activity, because
the utterance is a deed, it is active, productive. The children’s utterances resolve a
situation, bring it – for a moment at least - to an evaluative conclusion and extend action
into the future. Discourse then does not reflect a situation, it is a situation (Holquist, 1990).

In the following section I will discuss the aspect of imitation as a ‘leading activity’ of
language development and learning, a notion that I have introduced in the chapter on
storying. I will track the process of imitation in the transcription and I will show that
imitation in the TEO team is a deliberate active process of transformation of utterances
rather than the process of simple mimicry, mindless repetition or parroting that continues
to exist in many Luxembourgish classrooms where language learning is often based on
rote learning of vocabulary and of grammatical structures.

7.6.2.1 Imitation as a ‘leading activity’ of language development
I will now show how imitation can be considered as a ‘leading activity’ of language development and how it functions as a primary mechanism in language acquisition. As seen above, imitation may work as a selective and transformative mechanism resulting in reduction, expansion, and repetition of social models (Lantolf and Thorne, 2006). After F and A have hesitatingly agreed with V’s performance and production of ‘Ta soeur. [Your sister. FRENCH]’ in Turns 61 and 62, V is looking for an icon to label the recording as her own in Turn 63.

V chooses ‘Speedy Gonzales’ and comments on the procedure for selecting it with the finger representing the mouse on the screen: ‘Speedy Gonzales is his name. Eh. Ah yes, with the finger on it. LUX’. We will soon see the importance of the fact that V is controlling the mouse throughout the recording of ‘La Famille (The Family)’. In Turn 64 A announces: ‘And now hm it is my turn. LUX’. She does so light-heartedly and with good humour. Her laughter fulfils a meta-communicative function by facilitating and regulating the social bonds of the TEO team. A continues to enjoy the work in the group of human and non-human actors and her joy reinforces the conditions for successful cooperation and communication among the participants in the discourse (Lusetti, 2004). At the same time the slight hesitation ‘hm’ in the middle of her utterance indicates A’s need for adjustment in the chain of communication and production when there are shifts in the actor’s voices, in dialogue and in argumentation (Engeström and Escalante, 1996, Bakhtin, 1986, Billig,
Argumentative and dialogical modes of inquiry reinforce the transformational nature of the human learning activities (Iddings et al., 2005). Hesitations and reformulations are often necessary conditions for the continuation of the discourse and of the imitative, that is, the learning process. Indeed, the starting point of a learning activity is individually manifested doubt, hesitation and disturbance (Engeström, 1987). This kind of variability, often treated as perturbation in the orderly system of regular classrooms, characterises the transformation process above that constitutes an indication of skilled performance (Scribner, 1997). Not manifesting and not using hesitations may fail the continuation of the discourse. It is the slight hesitating pause which encourages F to propose the content of the next utterance to A, just at or even just before the end of her own turn: ‘Ma soeur s’appelle … [My sister is called … FRENCH].’

The imitation process launched with ‘Ta soeur [Your sister FRENCH]’ as replayed by TEO in Turn 59 is now modified and expanded into a new grammatical structure by F in Turn 65: ‘Ma soeur s’appelle … [My sister is called … FRENCH].’ A imitates and completes this utterance in Turn 66: ‘Ma soeur s’appelle Tessy. [My sister is called Tessy. FRENCH].’ The imitation procedure gains in complexity in Turn 67 where the utterance is treated by two actors simultaneously: A is speaking and authoring her contribution by repeating the same utterance whereas V is manipulating and synchronising the mouse by clicking for the start of the recording. Thus, V is performing a vicarious imitation of A’s performance by silently attending and by deciding on the start and on the end of the utterance. V is intimately involved in A’s imitative behaviour by giving - through the highly audible click with the mouse – the starting signal for A’s utterance to be recorded. I have
transcribed this complex process in Turn 67 by assimilating the two actors into the inscription V/A.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Actor</th>
<th>Start Time</th>
<th>End Time</th>
<th>Utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>F</td>
<td>151.08s</td>
<td>153.52s</td>
<td>Ma soeur s'appelle ...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called ... FRENCH]</td>
</tr>
<tr>
<td>66</td>
<td>A</td>
<td>153.29s</td>
<td>156.54s</td>
<td>Ma soeur s'appelle Tessy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called Tessy. FRENCH]</td>
</tr>
<tr>
<td>67</td>
<td>V/A</td>
<td>155.71s</td>
<td>158.49s</td>
<td>V. is recording A's utterance (clicks the mouse):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ma soeur s'appelle Tessy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called Tessy. FRENCH]</td>
</tr>
<tr>
<td>68</td>
<td>TEO</td>
<td>159.91s</td>
<td>161.76s</td>
<td>Ma soeur s'appelle Tessy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[My sister is called Tessy. FRENCH]</td>
</tr>
</tbody>
</table>

The mouse as an integral feature of the nonhuman actor TEO supports the agency of V in language learning (Plate 35). A is performing an utterance through transformative imitation that seems to be beyond V's immediate possibilities for performance in French. The hook on the mouse, however, allows V to be a silent participant in the construction of French language that for the moment seems to be beyond her competence and beyond her zone of proximal development. V is still a legitimately if peripherally participating actor in the team (Lave and Wenger, 1991). This silent period linked to the control of the turn of her interlocutor resembles a vicarious ‘performance before competence’ (Cazden, 1997) that will enable V to develop her competences in the French language while participating in joint relational language activities. Silent periods like the one in the transcription below in Turns 64 to 68 are essential in second or other language learning experiences, as they give some children supplementary time in order to gain confidence before entering the language production process (Dulay et al., 1982, Ellis, 1992).
After the replay of the recording by TEO, V maintains tight control of the proceedings through intense manipulating of the mouse in Turns 68-76 as shown in her determined utterances in the transcription below.

68  TEO  158.91s  161.78s  Ma soeur s’appelle Tessy.
   [My sister is called Tessy. FRENCH]
69  V   161.57s  164.11s  Wai e Mannchen heis du?
   [What figure do you take? LUX]
70  A   154.07s  157.53s  Mmh? … Deen do!
   [Mmh? … This one! LUX]
71  V   177.42s  180.34s  Deen?
   [This one? LUX]
72  V   158.66s  169.70s  Deen!
   [This one! LUX]
73  A   168.93s  168.65s  Deen!
   [This one! LUX]
74  A   169.37s  170.13s  Jo deen!
   [Yes this one! LUX]
75  F   171.09s  175.40s  De Pino huet gesoet ech derfi: zwar och matmaachen wann ech wellet.
   [Pino told me that I could also participate if I want too. LUX]
76  V   175.37s  177.88s  Ok, wat sees du?
   [Ok, what do you say? LUX]
After the replay of the French utterance by TEO in Turn 68 this sequence features only discourse in Luxembourgish in Turns 69-76, as is also visible in Graphic 36.

The discussion and the discourse in Luxembourgish are indicators of the strong position that V is holding in the TEO team. The nonhuman actor TEO supports V’s control of the language production process
- through her being able to manipulate the mouse,
- through her being in charge for selecting the icon for A’s utterance that has been recorded and,
- through her completing the procedure on the computer within the stretch of discourse.

In Plate 37 we can see A pointing at an icon on the screen. But it is also V, who through her manipulation of the mouse and of the TEO software, is jointly dominating the organisation of the discourse, together with A. It is manifest that V continues to influence the continuation of the team discourse by heavily relying on the authority conferred to her through the manipulation of the TEO tool.
V’s position is so dominant in spite of her lower status as a learner of the French language that F, in Turn 75, feels obliged to remark that the teacher had originally told him that he could at times participate in the composing of the story. This meets with no resistance from V who soberly welcomes a possible contribution, thus displaying an unrestrained confidence in the proceedings of the TEO team and obviously enjoying her status as an equal team member.

I have already shown how the process of imitation, often reduced to mimicry in regular Luxembourgish classrooms, is undergoing constant transformation in the language production work in the TEO team. The nonhuman actor TEO provides for the emergence of differentiated patterns of discourse out of the imitation of language elements and of language structures by duplicating and reinforcing the imitative process itself. I will now
turn to other appearances of the nonhuman actor TEO in the transcription and in the graphic display in order to continue with the analysis of its role and function in the TEO team. As can be seen in Graphic 38, Turns 77 to 84 involve one more discussion among the human actors in Luxembourgish about the next turn-taking in the continuing episode of the story ‘The Family’, a discussion that I will not be able to focus on because parts of it are inaudible.

Of more interest for expanding the previous discussion on imitation is the next section in the team discourse in Turns 85 to 104, where TEO reappears. This section shows exactly how the process of imitation around the nonhuman actor TEO is instantiated by the three human actors and by A and V in particular. In Turn 84 A had appealed in Luxembourgish to F to provide V with a model to imitate in order to continue the recording of the story. In Turn 85 F quickly and neutrally complies with this request by delivering his unique contribution to the whole sequence in the form of the following sentence in French: ‘Comment s’appelle ton frère? [What is the name of your brother? FRENCH]’. This sentence, while being imitated first by A, then by V, will be modified, reduced and finally temporarily expanded by both of them during the process of imitation. It is then recorded and replayed by the TEO tool in Turn 104, as can be seen in Graphic 39 and in the
transcription: ‘Comment … s’appelle … ton frère? [What … is the name … of your bother?’ FRENCH].

Graphic 39: Imitation process between V and A leading to the recording and TEO replay in Turn 104

<table>
<thead>
<tr>
<th>Turn</th>
<th>Role</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>F</td>
<td>201.17s</td>
<td>203.47s</td>
<td>Comment s’appelle ton frère? [What is the name of your brother? FRENCH]</td>
</tr>
<tr>
<td>86</td>
<td>A</td>
<td>203.70s</td>
<td>205.70s</td>
<td>Comment s’appelle ton frère … sol (directive) [What is the name of your brother FRENCH … say sol LUX]</td>
</tr>
<tr>
<td>87</td>
<td>V</td>
<td>205.64s</td>
<td>206.65s</td>
<td>Comment: [What FRENCH]</td>
</tr>
<tr>
<td>88</td>
<td>A</td>
<td>206.64s</td>
<td>207.61s</td>
<td>s’appelle [is the name FRENCH]</td>
</tr>
<tr>
<td>89</td>
<td>V</td>
<td>207.57s</td>
<td>208.46s</td>
<td>s’appelle [is the name FRENCH]</td>
</tr>
<tr>
<td>90</td>
<td>A</td>
<td>208.37s</td>
<td>209.65s</td>
<td>ton frère? [of your brother FRENCH]</td>
</tr>
<tr>
<td>91</td>
<td>V</td>
<td>209.32s</td>
<td>210.44s</td>
<td>ton frère? [of your brother FRENCH]</td>
</tr>
<tr>
<td>92</td>
<td>A</td>
<td>210.46s</td>
<td>213.55s</td>
<td>Say it together one time! LUX … What … FRENCH]</td>
</tr>
<tr>
<td>93</td>
<td>V</td>
<td>213.41s</td>
<td>214.39s</td>
<td>Comment: [What FRENCH]</td>
</tr>
<tr>
<td>94</td>
<td>A</td>
<td>214.01s</td>
<td>215.19s</td>
<td>s’appelle [is the name FRENCH]</td>
</tr>
<tr>
<td>95</td>
<td>V</td>
<td>214.88s</td>
<td>215.89s</td>
<td>s’appelle [is the name FRENCH]</td>
</tr>
<tr>
<td>96</td>
<td>A</td>
<td>215.78s</td>
<td>216.80s</td>
<td>ton frère? [of your brother? FRENCH]</td>
</tr>
</tbody>
</table>
After having attended to F’s contribution, A takes over and in Turn 86 immediately prompts V for the imitation and production of her part. A does so in a rather directive way by adding an explicit ‘say so!’ in Luxembourgish. Plates 40-44 below convey an idea of the gestures accompanying A’s invitation. These gestures succeed in attracting V’s attention to an utterance that proves to be rather complicated for her as is already visible in the mimics on her face during A’s challenging request.
Plate 40: In Turn 86 A accompanies her utterance with a circling move from her hand. The still picture shows the beginning of the gesture with V’s gaze moving from the screen in the direction of A.

Plate 41: A starts her circling gesture with the left hand in Turn 86.
Plate 42: At the end of A’s French utterance, V is looking directly at A in Turn 86.

Plate 43: A’s hand and arm have come to a rest at ‘say sol LUX’ with V looking intensely at the screen in Turn 86.
The transcription above shows how the TEO team moves from the model provided by F in Turn 85 to the replay in one single utterance of V's recording of three parts of the utterance separated by marked pauses: ‘Comment ... s'appelle ... ton f(r)ère? [What ... is the name ... of your b(r)other? FRENCH]’ in Turn 104. The analysis of this stretch of discourse (Turns 85-104) finally leading up to the TEO replay will identify TEO as a tool for splitting up discourse, for co-vocalising and sub-vocalising.

7.6.3 TEO as a tool for splitting up discourse, for co-vocalising and sub-vocalising

The human actors V and A instinctively reduce the pressure on V's language production capacities by applying the splitting up procedure provided by TEO to the elaboration of the utterance to be recorded by V. V intuitively signals her intention for
splitting up the sentence by putting a stress on ‘Comment [What FRENCH]’, slightly stopping after this word and introducing a pause, thus offering A the opportunity to step in and to offer her help with ‘s’appelle [is the name FRENCH]’. V imitates this part and both of them repeat the same procedure with ‘ton frère? [your brother? FRENCH]’, as A is nodding slightly with her head towards V. Then, in Turn 92, A is inviting V to put all the elements of the utterance together again: ‘So eng kéier zesumen! … Comment … [Say it together one time! LUX … What … FRENCH]’. While uttering these words, A is pointing with her right index towards V in Plate 45 and their gazes meet in a common encounter.

Plate 45: A’s right index is pointing towards V and their gazes will meet when the pointing is completed in Turn 92.

At the same time, from Turn 92 to Turn 97, F is echoing or shadowing A’s vocalisations by sub-vocalising the utterance, thus showing implicit support for A’s role and for her modelling, as can be seen in Plate 46. There is absolutely no need for the expert F to interfere with A’s competent input. F simply backs her contribution to the
ongoing discourse with his non-verbal voicing or sub-vocalising, with his body postures and his silent presence. At this point in the interaction and in the communicative process, F participates by not verbalising his contribution, which nevertheless is visible rather than audible, in particular also through him verbalising sub-audibly. F’s behaviour appears to validate Birdwhistell’s (1970, p. 48) claim that without being necessarily aware of it, ‘human beings are constantly engaged in adjustments to the presence and activities of other human beings. As sensitive organisms, they utilize their full sensory equipment in this adjustment.’

Although A insisted in Turn 92 that V should produce the complete utterance, both of them nevertheless set out to produce the separated elements of the intended utterance a second time and in the same order. The repetition of the sentence parts could be called a re-presentation of the previous sequence leading up to greater confidence in the performance through one more turn of practice. In both instances A can be considered to
closely co-vocalise V’s utterances with a loud voice, as can be seen by their slight overlapping from Turns 87 to 91 and again from Turns 93 to 97 in the transcriptions.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Participant</th>
<th>Time (s)</th>
<th>Time (s)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>V</td>
<td>205.64</td>
<td>205.65</td>
<td>Comment: [What FRENCH]</td>
</tr>
<tr>
<td>88</td>
<td>A</td>
<td>205.64</td>
<td>207.61</td>
<td>s’appelle</td>
</tr>
<tr>
<td>89</td>
<td>V</td>
<td>207.57</td>
<td>208.46</td>
<td>s’appelle</td>
</tr>
<tr>
<td>90</td>
<td>A</td>
<td>209.37</td>
<td>209.65</td>
<td>ton frère?</td>
</tr>
<tr>
<td>91</td>
<td>V</td>
<td>209.32</td>
<td>210.44</td>
<td>ton frère?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turn</th>
<th>Participant</th>
<th>Time (s)</th>
<th>Time (s)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>V</td>
<td>213.41</td>
<td>214.39</td>
<td>Comment: [What FRENCH]</td>
</tr>
<tr>
<td>94</td>
<td>A</td>
<td>214.01</td>
<td>215.19</td>
<td>s’appelle</td>
</tr>
<tr>
<td>95</td>
<td>V</td>
<td>214.88</td>
<td>215.89</td>
<td>s’appelle</td>
</tr>
<tr>
<td>96</td>
<td>A</td>
<td>215.78</td>
<td>216.89</td>
<td>ton frère?</td>
</tr>
<tr>
<td>97</td>
<td>V</td>
<td>215.69</td>
<td>217.72</td>
<td>ton frère?</td>
</tr>
</tbody>
</table>

In Turn 93, A is still continuing to recruit V’s attention with her index finger, even as V is already speaking. It is interesting that it is not only the verbal part of the utterance that is repeated by A and V. The repetition involves the entire gesture-speech construction, i.e. the gesture-speech ensemble (Kendon, 2004). Even if A’s gestures are not identical, they are strikingly similar. A changes the circling and pointing gesture with her index finger on the left hand to the right hand, but the overall construction of her gesture-speech ensemble remains the same, a strong indication that she had *constructed it as such* and that the gesture is as much a part of her construction as are her words. A’s fingers and hands act as conduits through which she extends her will to the world and that at the same time bring to her a perception and a knowledge of the world (McCullough, 1996). The
actions, movements and play of A’s hands and fingers can be considered as indicators or forms of her thinking, because thinking is an activity that involves the entire person (Streeck, 2009). A’s change of arms and hands is a partial re-design of the utterances through a re-orchestration of the gesture and speech components of the utterances, although from the point of view of propositional content it is a repetition. But along with intonation, gaze and voice level, the gesture creates a conversational move in the utterance. The relationship between word and gesture can be characterised as a reciprocal one as the gestural and the spoken component interact with one another to create a precise and vivid understanding (Kendon, 2004). Communication, understanding and intelligence are thus rooted in the earthy gestures of embodied organisms and not exclusively in the manipulation of explicit, language-like data structures (Clark, 1997).

Finally, in Turn 98, A prompts V to record the utterance as a whole and in one go as she feels confident enough that V might be successful. A moves her head and her gaze into the direction of the screen as can be seen in Plate 47, hence signalling to V whose gaze also turns from A to the screen that they are now ready for recording.
A’s gestures combine two functions: at one end they are aligned with what she is presently doing, that is, articulating the parts of the utterance to be recorded, and at the other end they are performed in attempts to structure and regulate V’s actions by selecting the area or object which V should attend (Streeck, 2009). A’s change of gaze functions like a pointing-gesture. She re-directs her gaze to the screen, thus making this object a locus of relevant information for her co-participant’s attention (Streeck, 2009). Within the TEO team, A’s and V’s configurations and shifts of posture display the working consensus (Scheflen, 1964, Goffman, 1959). While leaving the ownership of the utterance to V, A now shifts to another mode of vocalisation for continuing to support V in her effort. A changes from co-vocalising to sub-vocalising V’s utterances, a procedure that has been initiated in Turn 92. The children have definitely internalised the splitting up procedure afforded by TEO that we have met from Turn 31 on. This particular competence discovered and permanently re-discovered by working with TEO energetically enhances the emergent communicative possibilities in French. The human actors can spontaneously and intuitively integrate the splitting up procedure into the performing and recording of a whole sentence. The sentence ‘Comment … s’appelle … ton f(r)ère? [What … is the name … of your b(r)other? FRENCH]’ as constructed by A and V in Turns 92-97 and recorded by V and A in Turns 99-103 now contains the pauses between its elements. It will however be recorded non-stop by V in the presence of A’s sub-vocalising and replayed as an entity by TEO in Turn 104. The sentence could eventually have been recorded in three separate entities or utterances. But they find themselves reunited here in one utterance to be recorded by the targeted learner of the French language V. We are in the presence of an innovative procedure that results from the collection of utterances deployed in the TEO
tool (Eisenstein, 1979) where they are redistributed into new combinations (Latour, 1999).

In the sequence above, the human actors re-import what they have learned from TEO into the social realm by adopting a technique afforded by TEO for producing regular language that is used in ordinary human communication. At the end, the human actors will export this regular utterance back to the nonhuman actor TEO as is demonstrated by the recording process and by the TEO replay in Turn 104 (Latour, 1999).

I analyse the recording process of the utterance in Turns 99 to 103 in some detail, as it shines light on V’s vocalisation process as mediated by A’s sub-vocalising and the corresponding body movements, especially the gazes of both partners. The dim sub-vocalisation by A also leads to a different, i.e. softer than usual intonation by V in the recording of this utterance. In Turn 99 V records ‘Comment [What FRENCH]’, turns her head to the left towards A and throws a questioning look at A, as if she was desperately in need of endorsement, comfort and support. This behaviour can be seen in Plate 48.
After looking down and then at V, and after a pause of almost two seconds, A moves her head slightly towards the screen and starts to softly sub-vocalise the next part: ‘s’appelle [is the name FRENCH]’ in Turn 100, as can be seen in Plate 49.
A, by sub-vocalising, clearly takes the lead in the recording, leading V into the performance as it were. The look at the TEO screen indicates the material target to be inscribed by V’s verbal performance. Hence, it is also the screen with its inscribed and numbered icons that ‘keeps it all together’, that gives coherence and organisation to the patterns of recorded utterances. The current utterance can be recognised as building on previous ones and shaping subsequent ones. The recorded utterances derive their meaning also visually from their location in the visualised and numbered stream of action (Harper and Hughes, 1993). Thus, V’s performance is twice scaffolded, enabled and afforded in this particular situation: first by the human actor A’s verbal sub-voicing and second and simultaneously by the nonhuman actor TEO’s iconic re-presentation of the utterance or of the previously recorded utterances as an invitation for inscription.
In Turn 101 V adjusts her gaze to that of A in Plate 49, imitates A’s sub-vocalising and records the utterance ‘s’appelle [is the name FRENCH]’ with A looking at her performing. In Plate 50 V is looking at the screen.

Plate 50: V is looking at the screen while recording ‘s’appelle [is the name FRENCH]’ in Turn 101.

In Turn 102, while V and A are looking directly at each other in Plate 51, A is sub-vocalising very softly the last part of the utterance without observing too much of a pause and thus keeping up a certain rhythm: ‘ton frère? [of your brother? FRENCH]’.
V immediately joins in through slight overlapping and imitates A’s utterance, although not exactly in the same way. V tends to omit the first ‘r’ in ‘frère’ and almost inaudibly records ‘ton f(r)ère? [of your b(r)other? FRENCH]’. As there might only be a slight mistake depending exclusively on the severity of the judge, I have put the almost missing ‘r’ in brackets. Be it as it were, V seems quite happy to have made it to the end of the utterance. She is so pleased with her performance that she smiles at the end of the recording of the last part and before TEO starts with the replay of the complete utterance recorded. Smiles accompanying a common activity are described as expressing the consent among team members to the significance of the situation (Moro and Rodriguez, 2005). We can see V’s ravishment in Plate 52.
V's big smile signals the provisional endpoint of a highly important learning process that could only happen through the steps visible and audible in this recording and that will now be confirmed by the TEO replay. The learning sequence resulting in the recording by V of the utterance ‘Comment … s'appelle … ton f(r)ère? [What … is the name … of your b(r)other? FRENCH]’ has been originally initiated by F’s model, which is then imitated by A and is broken down into its constituent parts by mutual consent between A and V. Although the original authority in the discourse lies first with F and A, it is V who through the particular intonation and rhythm in her utterance imposes the splitting up of the utterance, immediately followed by A’s providing of the model. Co-vocalising between A and V leads to the double practice of the speaking of the parts with F sub-vocalising in the background. After the two rounds of co-practice V records the whole utterance with A sub-vocalising each part. V seems to rehearse and approve her performance inside of herself even before the external voice of TEO re-presents the utterance to the human actors. The