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Survey of narrative theories for learning environments

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Summary

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1 Introduction

Various perspectives to narrative and learning theories

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There are certainly various angles of interpretation and various ways to differentiate approaches to narrative and learning. In a collective book Bamberg and his colleagues (1997) distinguish among cognitive, interactive, linguistic/constructivist, cross-linguistic, socio-cultural and life-span approaches. Interestingly this collection of papers shows that going into each framework helps the tenants of each approach to understand each of them better and to generate more respect to one another work. Why confronting such approaches is so interesting, I believe, resides in the fact that each proposes a specific definition of narrative, contains a vision of the child or the narrator, and suggests implicitly an orientation to technology development. Broadly speaking there are two distinct orientations in narrative and narrative analysis: one emphasizes the individual aspect of narrative and the second emphasizes the social aspect. Following the first orientation the focus is on the individual experience of persons and the sharing of this experience with an audience. The second focus is on society, groups, institutions or "socially shared practices", 'the social matrix against which the particular experience is understandable and makes sense is what gives meaning to texts, to accounts of an experience, to the experience itself, and ultimately to the person who is telling it" (Bamberg, p. 90).

In what follows, I will try to give an account of these differences and how they are interesting for our purpose of technology enhanced learning related to narratives.

1.1 Cognitive approach

Cognitive approaches (Stein and Albro, 1997) focus their investigations on children's knowledge of stories and storytelling in terms of goals-directed actions. The importance to cognitive abilities to organize content, (goals, actions and outcomes) and structure, (episodes) have to be organised and sustained by relations into a coherent whole connecting the episodes. Understanding the ability to tell stories calls for a theory of human intentionality and action. The definition of story requires a goal-directed action sequence and the cognitive approach raises the question of the development of this function.

The cognitive approach views the child as an active organizer of information who master solid cognitive tools to sort information into relevant schemas in order to take decisions. Storytelling is the result of organizing the flow of information into relevant schemas. Narrators are basically viewed as rational and logical persons.

A good story must take indirect or direct reference to goal based action (Stein and Glenn, 1979; Mandler and Johnson, 1979) and includes the following dimensions : - an animate protagonist capable of intentional action; - an explicit statement of desires and goals of the protagonist; - the overt actions carried out in the service of the protagonist's goals; - the outcomes related to the attainment or non-attainment of these goals.

As explained by Stein and Albro (1998): "Adult storytellers typically design their narratives so that the first episode ends with an outcome that either blocks the attainment of important goals (see Botvin & Sutton-Smith, 1977, or Propp, 1958), or results in the presence of unexpected circumstances. Few adults leave their protagonists in this initial set of negative circumstances", p. 5.

1.2 Interactive approach

With the interactive approach the analysis of narrative is closely related to the activity of narrating which is discursively achieved as an interactive process

between the narrator and the listener. Focus is given to how co-participants produce the narrative, "do" narrating. As indicated by Quasthoff (1997), contrary to structuralist approaches, the form of narrative and its content are not the starting point of investigation due to the fact that they are derived from this activity.

Therefore what is important here is that the idea of *decontextualising* the narrator from his narrating activity, which is done by most structuralist approach, is questioned. Narrating performed by two individuals is the relevant unit of analysis, "the concept of an individual person in this approach is backgrounded in favour of the concept of an interactive situation, of which the person becomes an integrated part" p.46.

Narrating is performed by at least two persons, it could be two children, one child-an adult; the central idea is that both persons are equally important. Balance and consensus are the axes of the telos of development. The initial unbalanced parent-child interactions is gradually levelled through development. And Bamberg comments this process by saying that "although the contributions of both participants change over time, only the child can be viewed as a developing unit, increasing his or her communicative competence. This development can empirically be described as taking place within the child with its developmental telos of communicative competence, but (…) it only functions as one component of the integrated whole that is the interactive situation", p.47.

Tenants of this approach perform micro-analytic analysis of interactive transcripts to analyse the changes both in terms of linguistic forms and interactive functions that occur over time. To conclude the somewhat *holistic* perspective given to development is interesting: it put in the background internalization of strategies, skills and knowledge domains and in the forefront the situational mechanisms as main learning processes.

1.3 Constructivist approach

Narrative is a part of the domain of language use, a kind of discourse format.[1] As remarked by Bamberg, the definition of narrative is here broader relatively to the other approaches. Third-person and first-person narratives are given equal weight. Explanatory accounts are defined as narratives "as long as generalized actors (one, you, they) act and position themselves in their actions vis-à-vis others, which seems to relinquish Labov and Waletzky's definition of a minimal narrative consisting of two events happening sequentially".

The child is viewed as an active learner, learning linguistic structures that will be used for interpersonal and social purposes. As stressed by Bamberg what is implicit in the constructivist approach to narrative development is that "the person is actively involved in the construction of his own life and that meanings are inserted into life through participation in linguistic practices", p. 86.

1.4 Cross-cultural approach

With the cross-cultural angle, narrative structure is a construct less cognitive but more language specific. The approach proposed by MacCabe suggests multiple systems of analysis applied to various narrative structures looking at parameters such as normal versus atypical development, parental influence, gender and culture. The approach taken by MacCabe therefore is somewhat interdisciplinary embracing aspects grounded in the cognitive, interactive and constructivist approach.

MacCabe (1997) adopts a broad definition of narrative. "Narratives usually concern real or pretend memories of something that happened and therefore are often largely in the past tense. However, there are also hypothetical, future-tense narratives and others given in present tense. Narratives often contain a chronological sequence of events, but one can also find narratives that contain

[1] Bamberg makes the distinction between a « cognitive constructivism » such as the one by Piaget, where the child's mind builds knowledge through adaptation and organization, and a "social constructivism" where what is built is not knowledge and information but experience and self., built in cultural practices rather in the mind.

only a single event or those that skip around in time. Narrative usually refers to a kind of language, although there are musical, pictoral, and silently dramatic narratives. Narrative is a linguistic cross-roads of culture, cognition and emotion and serves the dual functions of sense making and self-presentation", p. 137.

This tradition values the narrator as being the representative of a cultural tradition through his own subjectivity. The learning process put the accent on how the expression of subjectivity is acquired and practiced in family, in communities, at schools. Interestingly also, and we will come back to this point in section 1 of this deliverable, is the different cultural conventions and values that give strong orientations for different developmental pathways, for instance the value of personal relationships in Latino traditions, the intentional willful values of white north American. Different development contours emerge for Latino, African American and Japanese children with a breaking point around the age of 6 years old where the major narrative structures are formed (MacCabe, 1997b).

1.5 Socio-cultural approach

Nicolopoulou (1997) makes three claims with respect to narrative and learning.

(1) The role of narrative need to be studied as a vehicle of meaning construction and as a symbolic form whose function is to construct reality and give meaning to experience. By stressing this aspect she wants to integrate into a coherent approach a formal approach to narrative and a more interpretive perspective " whose crucial task is to reconstruct and elucidate the structures of meaning that children embody and express", p. 208. Therefore the analytical tools that are used attempt to capture both the forms and symbolic content and to understand their relations. In the socio-cultural approach contents and forms that are used to build narrative pre-exist as images, models and meanings in the larger context of the culture were they have been progressively constructed. Children are viewed as active in constructing such meanings. In narrating and

play activities children are elaborating on individual and the pre-existing cultural world. This approach raises the need to study play and narrative more closely.

(2) Narratives must be studied by focusing on the action side of their production, therefore what children do with narrative individually and collectively. "Children *use* stories and other symbolic constructions to represent the world to themselves as well as to each other. In the process, these representations play a vital role in their efforts to *make* sense of the world and to find their places in it. Simultaneously, they use their stories as a way of expressing and working over certain emotionally important themes that preoccupy them (…) p. 208.

(3) Narrative activity is socio-cultural, "it emerges from an active interplay between the individual and his or her cultural world. In constructing their stories, children draw on images and conceptual resources present in their cultural environment, which shape their imagination and sensibility in profound and subtle ways", p. 209. This interplay does not follow the rule of absorption but rather appropriation and selective construction. Therefore understanding these processes requires to situate children's narrative activity in the socio-cultural context of everyday interaction, communities and cultural world. The main pioneers authors of these approaches are Vygotsky and Bruner as we will see in section 1.

1.6 Structure of this deliverable

Through this deliverable of the SIG Narrative and Learning, our objectives are to explore the value of different narrative theories for their use in learning environments.

In Section 1 of this deliverable we will come back more in depth to the socio-cultural perspective approach of narrative. It contains Antonio Rizzo and myself works on narrative and learning theories. The choices it proposes (in terms of main authors and concepts) are guided by our hypothesis on what narrative is according to observational studies we made in Italy and Belgium and

to evaluation of the POGO environment[2] at school. It describes a vision which somehow relinquish the relations between the formal approach and the interpretive approach by proposing to explore new forms of relations between non linear forms of narrative and expressions of emotions and meanings.

Section 2 presents a thorough analysis of a literary vision of narratives theories and narrative structures and relates it to narrativity, the relation between narrative and user. It also contains the vision of narrative learning theories by their authors Ana Vaz, Isabel Machado, Ana Paiva, Giuliana Dettori and Karl Steffens grounded on Vygtosky, Bruner and Piaget works.

1.7 References

Bamberg, M. (1997). Narrative development: six approaches. Lawrence Erlbaum, London.

Bruner, J. (1990). *Acts of meaning*. Harvard University Press, Cambridge MA.

Quasthoff, U.M. (1997). An interactive approach to narrative development. In M. Bamberg, Narrative development : six approaches. Lawrence Erlbaum, London.

MacCabe, A. (1997). Developmental and cross-cultural aspects of children's narration. In M. Bamberg, Narrative development : six approaches. Lawrence Erlbaum, London.

[2] The POGO environment has been developed within the I3 program, ESE Experimental School Environment. The POGO consortium was mainly composed of Philips Design (NL), University of Siena (I), Domus Academy (I), University of Liege (B). The environment has been conceived as a virtual story world, accessible through a number of interactive physical tools distributed in the environment (Rizzo et al., 2002). The active tools are the main interface to the narrative process. The functionality of the tools span over many areas, gestural (live performances), visual (manipulation of images and drawings), aural (sounds and atmospheres), manipulative (physical feedback) and material (physical objects). Although the system is computer-based, the standard computer interface of keyboard, screen and mouse has been replaced with a far more intuitive one. The interaction is very simple so that children can begin to play with no need for instruction.

MacCabe, A. (1997b). Cultural background and storytelling : a review and implications for schooling. *Elementary School Journal*, 97, 5, 453-473.

Mandler, J.M., & Johnson, N.S. (1977). Remembrance of things parsed: story structure and recall. *Cognitive Psychology*, 9, 111-151.

Nicolopoulou, A. (1997). Children and narratives : toward an interpretive and sociocultural approach. In M. Bamberg, Narrative development : six approaches. Lawrence Erlbaum, London.

Stein, N.L. & Albro, E.R. (1997). Building complexity and coherence : children's use of goal-structured knowledge in telling stories. In M. Bamberg, Narrative development : six approaches. Lawrence Erlbaum, London.

Stein, N.L. & Glenn, C.G. (1979). An analysis of story comprehension in elementary school children. In R.O. Freedle (Ed.), New directions in discourse processing, Vol. 2, Advances in discourse processes, Ablex, Norwood.

2 Section I.

Relations between a socio-cultural approach and non-linear means of expression

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In this section we ground our vision on narrative on the work of two main authors, namely Vygotsky and Bruner socio-cultural and folk psychology approach.

We will then explore relations between emotions and meaning expressions and non -linear forms of narration based on a combination of new medias.

2.1 Socio-cultural approaches to narrative

2.1.1 Vygotsky's : learning as a socio-cultural process

The formation of mind is a socio-cultural process and can only be studied by situating individual development in its socio-cultural context. "Cognitive structures are embodied, not only in the individual mind, but also and specifically in culture. They are culturally shaped and transmitted and they develop historically", Bamberg (op. Cite, p. 195).

The theoretical position of Vygotsky can be summarised in three main assumptions and related principles.

1) Higher mental processes in the individual have their origin in social processes - ***The general law of cultural development***

"Any function in children's cultural development appears at two levels. First it appears on the social plane and then on the psychological plane. First it appears between people as an inter-psychological category and then within the individual child as an intra-psychological category... but it goes without saying that internalisation transforms the process itself and changes its structure and functions. Social relations or relations among people genetically underly all higher functions and their relationships" (Vygotsky, 1978).

Two implications might be derived from this assumption. First resources which are embodied in culture contains *organizing cognitive structures* that the child needs to appropriate. Second a process of active appropriation is required and the active interplay among the individual and his cultural world is central.

2) Mental processes can be understood only if we understand the tools and signs that mediate them. ***The law of semiotic mediation***

Vygotsky named the process of mediation as the principle of extra cortical organisation of complex mental functions. The development and the use of tools extend cognitive processing beyond the biological dimension of the nervous system, giving a crucial role to artificial stimuli in psychological activity. This stimuli may be of a cultural or external nature or produced by humans themselves. The embodiment of external representations in psychological activity allows completely new and unpredictable behavioural patterns.

This assumption was directly influenced by the historical materialism. Marx and Engels consider the artefact as an aspect of the material world that has been modified over the history of its incorporation into goal-directed human actions. By virtue of the changes wrought in the process of their creation and use, artefacts are simultaneously ideal and material.

Semiotic mediation is a key-point to all aspects of knowledge co-construction. For Vygotsky, semiotic mechanisms (including psychological

tools) mediate social and individual functioning, and connect the external and the internal, the social and the individual (Wertsch and Stone, 1985).

Vygotsky (1981) listed a number of examples of semiotic means: "language; various systems of counting; mnemonic techniques; algebraic symbol systems; works of art; writing; schemes, diagrams, maps and mechanical drawings; all sorts of conventional signs and so on" (p. 137). Other tools, increasingly recognised in socio-cultural discourse -- the paint brush, the computer, calendars, and symbol systems -- are central to the appropriation of knowledge through representational activity.

Thus, psychological tools are not invented by the individual in isolation. They are products of socio-cultural evolution to which individuals have access by being actively engaged in the practices of their communities. In a recent article, Wertsch (1994) elaborates on the centrality of mediation in understanding Vygotsky's contributions to psychology and education.

"[Mediation] is the key in his approach to understanding how human mental functioning is tied to cultural, institutional, and historical settings since these settings shape and provide the cultural tools that are mastered by individuals to form this functioning. In this approach, the mediational means are what might be termed the "carriers" of socio-cultural patterns and knowledge." (p. 204)

3) Mental processes can be properly understood only considering how and where they occur in growth - ***The genetic method***

"We need to concentrate not on the product of development but on the very process by which higher forms are established… to encompass in research the process of a giving thing's development in all its phase and changes – from birth to death – fundamentally means to discover its nature, its essence for it is only in movement that a body shows what it is. Thus the historical study of behaviour is not an auxiliary aspect of theoretical study, but rather forms its very base." (Vygotsky, 1978).

Vygotsky used genetic analysis which examines the origins and the history of phenomena, focusing on their interconnectedness, to develop his theoretical framework and guide his research. In describing this approach he emphasised the

need to concentrate not on the product of development but on the very process by which higher forms are established.

According to this perspective, learning and development takes place in socially and culturally shaped contexts. Historical conditions are constantly changing, resulting in changed contexts and opportunities for learning.

The three main assumptions are operatively summarised in the concept of *Zone of Proximal Development (ZPD)*. It is the distance between the actual development level as determined by indivdual problem solving and the level of potential development as determined under adult guidance or in collaboration with more capable peers. According to Vygotsky, education precedes development. Things that a pupil can make in cooperation today, will be done by the child alone tomorrow. Thefore the only good orientation of education is the one that anticipates and leads development. It shouldn't be addressed as much to mature functions, rather than to those functions that are growing.

Ann Brown and her collaborators (1993) have developed and implemented educational programs based on this concept of learning. They suggest that the active agents within the zone of proximal development "can include people, adults and children, with various degrees of expertise, but it can also include artefacts, such as books, videos, wall displays, scientific equipment and a computer environment intended to support intentional learning" (1993, p. 191). In expanding the zone of proximal development to include artefacts in addition to people, Brown integrates Vygotsky's analyses of tools and symbols with the roles played by the participants in the learning process. One of the important features of Brown and her collaborators' work is the examination of the way "divergent classrooms can become learning communities -- communities in which each participant makes significant contributions to the emergent understandings of all members, despite having unequal knowledge concerning the topic under study" (Palincsar, Brown, & Campione, 1993, p. 43). They examine the role of "reciprocal teaching," an approach in which "students and teachers take turns leading discussions about shared text" (p. 43), to see whether structured dialogues foster a learning community. The teachers in these studies have a changing role. They share with the students the well-defined tasks of

questioning, clarifying, summarising, and predicting in order to construct text-based knowledge. These studies exemplify two themes in socio-cultural approaches to classroom learning and teaching –

(1) the implementation of an educational program that allows for or encourages the co-construction of knowledge and

(2) the analysis of this learning that contributes to our understanding of classroom learning from a socio-cultural perspective.

Collaborative learning plays an increasing role in these as well as many other innovative classrooms (see also Bruner in this document).

2.1.1.1 The cycle of creativity and imagination

The contribution of Vygotsky to the narrative phenomenon can be viewed through two angles. His study of children's play and how play is the vehicle of children expressive imagination and as tools that they use to master reality.

Vygotsky sees the education as the fulcrum of the cultural evolution and sees the education process focused on the psychological processes of creativity and imagination. It is in this context that Vygotsky copes with the narrative phenomena.

Vygotsky opposes an evolutionist definition of creativity and imagination to the common sense definitions. Imagination, is present in all – without any exception – aspects of cultural life, and it makes possible artistic, scientific, and technical creativity. For Vygotsky imagination is not psychologically opposed to reality but it's closely interrelated with it.

Reality and imagination are related in, at least, four relations/laws :

1) The creative activity of imagination directly depends on the richness and variety of the previous experience made by an individual, because fantasy's constructions are composed of the material supplied by experience.

   The combinatory activity of our brain is not something absolutely new in comparison with its conservation activity (memory) : it's a further complication of the first one. Fantasy is not antithetic to memory, but the

first one is supported by the second one and imagination disposes traces of events in new forms.

2) The second form of relation between fantasy and reality is a different and more complex one which doesn't occur between the elements of fantastic construction and reality, but it occurs between the ready product of fantasy and any complex phenomenon of reality.

For instance, the construction of French revolution or Sahara desert through other's memories, stories, studies. This is a form of relation which is made possible only thanks to other's experience, to the social experience. Knowledge/Memory as imaginative construction of reality through social practice.

3) The third form of relation between imagination and reality is the emotional one. In, this relation we can distinguish two different aspects :
   - law of the common emotional sign
   - law of reality of the imagination

4) A construction of fantasy may constitute something effectively new, something which has never existed before in the experience of a man, and which doesn't correspond to any object/concept really existing : yet once that this crystallised image of imagination is externally embodied, once it's concretised, once it has become a thing among other things, it really starts to exist in the world, and to act on other things.
   This is true for physical objects (devices, machines, etc.). This aspect of relation between reality and imagination closes the circle opened by the first relation : from real world to imaginary back to real world.

2.1.1.2 Educational framework

According to Vygotsky there are thousand ways to combine reality and fantasy: play, narrative, songs, theatre, pictures, and more in general art and science are expressions of the same phenomenon of combination of the four laws

explained above. To each law it is possible to associate learning orientations aims. For instance (Decortis et al. 2002; Rizzo et al. 2003) :

Relationships 1 and 2 : Expand as much as possible the sensorial experience of children within each type of relationships. It is extremely important to :

- Allow comparison and experimentation among the relationships 1 and 2.
- Stress the social origin of relationship 2.

Relationship 3 : Allow children to develop emotional knowledge (e.g. empathy) through the law of the common emotional sign and the law of reality of imagination. This objective has many implications that have not been explored in any details specially for what concerns its social nature.

Relationship 4 : It is extremely important to allow children to complete the circle of creative imagination that started from sensorial knowledge of reality and that had to go back to reality through the active modification of the environment produced by the embodiment of the imagination. The process of embodiment concerns not just the material/technical aspects but also the emotional/experimental ones (e.g. metaphor).

2.1.2 Bruner 'folk psychology' as an instrument of culture

Bruner gives the following definition to narrative.

> *"It is culture that shapes human life and the human mind, that gives meaning to action by situating its underlying intentional states in an interpretive system. It does this by imposing the patterns inherent in the culture's symbolic systems - its language and discourse modes, the forms of logical and narrative explication, and the patterns of mutual dependent communal life".*

"The central concept of a human psychology is meaning and the processes and transactions involved in the construction of meanings".

First lets examine what Bruner intends by a "folk psychology" and second why this theoretical framework is relevant to the narrative development. By folk psychology Bruner means a system by which we organize our experience and knowledge and transactions with the social world. All cultures would have a folk psychology (called also a folk social science, or common sense), which comprises a set of descriptions about how we function, how our mind and others are a like, what are possible modes of life, how our actions are situated. This folk psychology is learned early through interactions with the culture, our family, our school. Folk psychology has some of its roots in the work of anthropologists (Levis Strauss, "The savage mind", Hutchins, 1983).

Bruner defines several premises for folk psychology : we have beliefs and desires, we believe that the world around us has a certain kind of organization, we give values to things that are more important than others. The world around us gives a context in which our acts are situated and the states of the world may justify our beliefs. We may give meanings to some of the events and recognize that others find different meanings. Therefore "in folk psychology people are assumed to have world knowledge that takes the form of beliefs, and are assumed to use that world knowledge in carrying out any program of desire or action". And also "this reciprocal relation between perceived states of the world and one's desire, each affecting the other, creates a subtle dramatism about human action which also informs the narrative structure of folk psychology".

Bruner sustains (1) a need to understand how children experiences and acts are shaped by their intentional states, (2) to understand how the form of these intentional states is realized through participation in the symbolic systems of the culture.

Narratives ? what are their functions ? how they differ from other modes of organizing experience ?

For Bruner narratives have several features (1990) : its "sequentiality", "its factual indifference", "its unique way of managing departures form the canonical".

(1) Sequentiality: a narrative is constituted of several elements : a sequence of events, mental states, happenings involving human beings as characters or actors. The act of "grasping a narrative" is dual : the interpreter grasps the narrative plot to give a meaning to its constituents, and he relates these constituents to that plot; - the plot configuration must be extracted from the succession of events which change, these changes revealing hidden aspects of the situation and the characters (Ricoeur, 1983).

(2) Narrative can be "real" or "imaginary"

Bruner observes a common form (a sequential form) in empirical (real) and imaginary storytelling. He attributes this shared structure not so much to a traditional heritage as to a "human predisposition" (p. 45) . From the pre-linguistic age individuals are endowed with a capability to grasp meaning which evolves with language acquisition. In this perspective narration appears as a "symbolic system", an interpretative scheme, which mediates between reality and signs, as well as Peirce's "interpretant"(p.149).

According to Bruner (1990) the story has a structure that is internal to discourse. The sequence of its sentences determines its overall configuration or plot. "It is this unique sequentiality that is indispensable to a story's significance and to the mode of mental organization in terms of which it is grasped. Efforts to dethrone this 'rule of sequence' as the hallmark of narrative have all yielded accounts of narrative that sacrifice its uniqueness to some other goal".

Bruner accepts that tradition plays an important role in giving narrative its structure, which does not mean, like Jung suggests it, that we store archetypal stories or myths. He means that there is a readiness to organize experience into a narrative form. Narrative consists in reporting things

that occur in our daily life in their order as they occurred. This confer drama its nature given that it imitates life. [3]

(3) Narration as a mean of "forging links between the exceptional and the ordinary". Bruner argues that narrative occurs when beliefs are violated and that a meaning is given to these violations, "*the function of the story is to find an intentional state that mitigates or at least makes comprehensible deviation from a canonical cultural pattern*". The narrative capability of dealing simultaneously with canonicality and exceptionality allows to negotiate meanings, a point seen as essential in the conduct of a culture.

2.1.2.1 Role of narrative in the organization of experience

There are two ways in which narrative plays a role in the organization of experience according to Bruner : the framing or schematizing and the affect regulation.

Framing allows to construct the world, to represent its flow, to segment events that occur in the world. The main form of framing is under a narrative form. Mandler [4] shows that things that are not structured under a narrative form will have less chance to be memorized. But framing is also social (Bruner here cites the work by Shotter [5]and Bartlett), "designed for the sharing of memory within a culture rather than simply to ensure individual storage". According to Bruner, Bartlett takes also into account the cultural dimension of remembering, what Bartlett calls the "social psychology of remembering". Bruner quotes Bartlett [6]:

[3]See the Aristotle concept of *mimesis* meaning that drama captures "life in action," containing an amelioration of what happened in real life.
[4] Mandler, J. (1984). Stories, scripts and scenes: aspects of schema theory. Lawrence Erlbaum, Hillsdale, NJ.
[5] Shotter, J. (1990) The social construction of forgetting and remembering. In D. Midleton & D. Edwards (Eds), Collective Memory. Sage, London.
[6] Bartlett, F.C. (1932). Remembering : astudy in experimental and social psychology . Cambridge University Press, Cambridge MA.

"Every social group is organized and held together by some psychological tendency or group of tendencies, which give the group a bias in its dealings with external circumstances. The bias constructs the special persistent features of group culture, and this immediately settle what the individual will observe in his environment and what he will connect from his past life with this direct response. It does this markedly in two ways. First, by providing that setting of interest, excitement and emotion which favors the development of specific images, and secondly, by providing a persistent framework of institutions and customs which acts as a schematic basis for constructive memory".

Concerning the second point on *regulating affect* Bruner after Bartlett insists that memory schemas are under the control of an affective regulation and attitude. When we try to remember something, most often the first element that comes to mind is an affect or a "charged attitude", something unpleasant or embarassing or something exciting. The affect is somewhat encoded with the memory slot and the recall is done on the basis of this attitude. And Bruner continues saying that "the very processes involved in having and holding experience are informed by schemata steeped in folk psychological conceptions of our world- the constituent beliefs and the larger-scale narratives that contain them in those temporal configurations or plots to which reference was made earlier".

2.1.2.2 The concept of child

In Bruner theoretical framework (1996) the child is a "thinker". He is at the centre of the educational process, his point of view is to be recognized as central. The teacher/educator should understand what the child is thinking.

The child is not ignorant and not even is he an empty recipient, but the child is able to reason, to give meaning by himself and through the discussion with others. The child is not less able than adult to concentrate on his own thinking and to correct his ideas and conceptions by thinking about it.

Like the adult the child is considered as building more or less coherent "theories" about the world and also about his own thought and the way he

behaves and functions. These naive theories are confronted with the ones of his parents and teachers not through imitations or through didactic instructions but through the discourse, collaboration and negociation. According to Bruner (1996), Feldman (1991), Stock (1983), knowledge is what is shared inside the discourse within a "textual community". Truth comes from proof, argument and construction rather than authority.

2.1.2.3 Educational framework

The educational approach that comes from this conception of the child is said mutual and dialectic, its interests focus on interpretation and understanding rather than on success of factual knowledge. The approach is not only focused on the child but also is less protective toward the child mind given that it aims to promote an understanding exchange between the teacher and the child.

Lets illustrate these issues by some of the observations we made in the POGO project at *Hamaide school* (Decortis et al 1999*)*. At the end of 'Slice of life' activity, the teacher showed to children the different narratives created by each child on the theme 'How I feel in my mummy's tummy'. The discussion was orientated toward the consciousness that from a same thematic every child could give a personal and different meaning to one life event, and that is important that each child recognizes that the other could have his own point of the view that could be different from its own.

One child came to the teacher for the narrative dictation about "How I feel in my mummy's tummy". The child told the story and the teacher wrote it in the rough book. The dialogue between the teacher and the child has been about the expression of the child feeling , emotions (feel), sensoriality (hear, see) and imagination (imagine).

Bruner (1996) makes also the distinction between **internal and external** educational frameworks. The external theories focus on what the adult could bring to children from outside the child in order to develop their learning. The internal views are interested by what the child can do, to what he knows he is doing, and to the mean by which the learning could be installed from his intentional states.

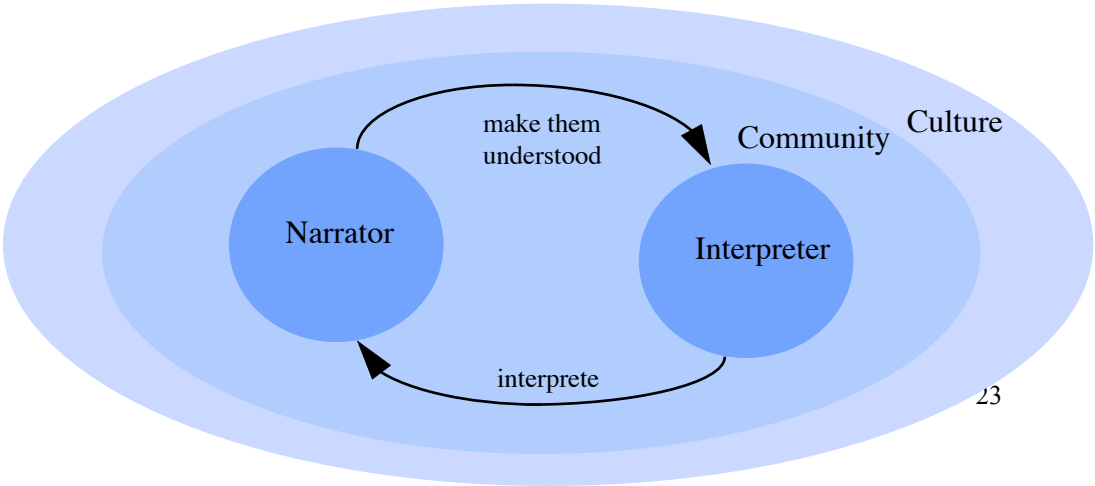
Therefore educational objectives aim to support the child in his understanding process. Understanding is elaborated and supported through *discussion* and *cooperation*. The child is encouraged to express his own point of view in order to succeed to confront his own point of views with the ones of others. Such an educational framework focus on the *mutual exchange*, through discussions and interactions beliefs and ideas could evolve toward a shared mutual understanding. Children and adults may have different view points and they are encourage to recognize the other's point of view.

The way the child learns to interpret what others are thinking, feeling, their intentions and moreover what they are meaning when they express themselves is crucial.

Our observations at *schools* (Cioni et al. 2000) indicate that children learn to build stories to make them understood by other children (the above figure illustrates the interrelationships between narrating and interpreting), and this might require from the teller side to understand what others are thinking. "Good" stories should fit the teller *intentions*. Absurd stories could be created if this is the intention of the narrator. Therefore the narrator makes several choices when he builds stories such as the story style (realistic, fantastic, fictional...); the story type (comic, adventure...); the text presentation (through expression, vocabulary).

A "good" story is also produced when the listener/reader /interpreter is able to understand the teller intentions.

Our observations also show that through narratives children learn to capture the attention of the audience, to move the listener/reader (emotionally), and when



they are in the listener/reader position to *feel* what is told.

Bruner (1996) suggests four directions in the educational framework :

(1) the way the child develops his ability to read in other's mind, to succeed to know what others think or feel. This question the issue of *intersubjectivity*.
(2) the way the child grasps others intentional states, their beliefs, their intentions, their desire, their *mind theories*.
(3) the study of *metacognition*, that is to say the way in which children think about learning, remembering, thinking, the way according to which thinking to our own cognitive operations changes our mental strategies.
4) the study of *cooperative learning* and problem solving focus on the way children explain and revise their beliefs through discourse.

2.1.2.3.1 Intersubjectivity is the way humans come to know each other's mind"

With respect to the Vygotskian concept of ZPD (Zone of Proximal Development), Bruner explores more in depth the nature of the social interactions that support children's development.

Bruner (1997) shows that in the concept of zpd, which is the point of the Vygotskyan framework where the importance of intersubjectivity is more evident, the mechanisms underlying the mutual exchange between "teachers" and "learners" are not analysed. The analysis of these mechanisms is one of the main topics of Bruner research: what happens in our minds when we interact with others? Which are the mental processes that regulate mutual exchange? In other words, how does intersubjectivity works?

Bruner highlights the "canonical relationship" between saying and doing: "the meaning placed on most acts by the participants in any every day encounter depends upon what they say to one another in advance, concurrently, or after they have acted."(p. 18).

It is to say that every linguistic act, in Austin's terms, implies an interactive process of meaning negociation between the participants. Its interpretation depends on the cultural setting and the context where it takes place and on the mutual exchanges that occur between the individuals involved. All these elements belong to the domain of intersubjectivity.

According to Bruner (1990) human beings have a kind of innate readiness to intersubjectivity that manifests itself in children's pre-linguistic phase of development and evolves through social experience. In his studies about language acquisition (1989) Bruner analyses some forms of proto-conversation between children and care-givers that occur in the context of very regular and codified structures of interaction (formats).

The first one is looks' co-orientation: mother follows child's look and names the objects toward which the look is directed. By monitoring child's eyes' movements, she facilitates the development of his ability to recognise her own center of attention.

Around the second semester of child's life the child-mother interaction has already achieved a good level of synchronism which regulates the turn taking process and the coordination of attention.

More complex forms of communication as ostensive reference and attention's request start to manifest themselves during the first year of child's life.

In this pre-linguistic phase, the interaction is guided and facilitated by the adults' structuring an supporting activity (scaffolding).

Adults sensibility is fundamental in particular for the development of children's intentionality.

Care-givers behave as if the child was able to understand their intention, as if he had a theory of mind.

In this way the child gradually learns that his behaviour is the object of others' interpretation and that it can affect others' behaviours.

Even if he doesn't attributes to the pre-linguistic child a conscious intentionality, Bruner (1990) considers our early ability to have meaningful exchanges with other people as a "primitive form of folk psychology", "a set of predispositions to construct the social world in a particular way and to act upon our construals"(p. 72).

2.1.2.3.2 Metacognition

Concerning metacognition, technological environment should be improved to support *metacognitive processes,* rather than being tools to support memory (i.e. what I do when I memorize something or remember something ?). For Bruner metacognition is a fundamental mean to "create alternate ways of conceiving of reality making" (1996) While education devotes a great effort to develop children's metacognitive competence about rational thought, there is an ideological prejudice toward an epistemological reflection about narrative. Indeed, as Bruner argues, "we live most of our lives in a world constructed according to the rules and devices of narrative". That's why educational initiatives should promote the creation of a "metacognitive sensitivity" to endow children with a "consciousness to what narrative construal imposes on the world of reality it creates".

Bruner explained that metacognition can be facilitated by "externalizing" mental work into a more concrete activity. "Externalized" tasks can lead children to "think about their own thought" , because "it embobies thoughts and intentions in a form more accessible to reflective efforts". (1996).

According to Bruner, metacognition on a collective class's work can be produced by a discussion on a class activity report which "highlights "overall" rather than individual progress". Collective works "create shared and negociable ways of thinking in group".

Education aims also to help children to make the differences between *personal knowledge* and what is *prescribed knowledge* according to the culture. The teachers we met comment that narratives should be personal and should not reproduce what they consider as "raw cultural material". For example if a child is invited to tell a story and if he talks about the "Titanic" movy, the teacher will encourage him to rely on his personal experience and events to build his story.

What are the technological/educational implications of Bruner's folk psychology ? We define a series of pedagogical implications related to technology (Decortis et al. 1999, Fusai et al., 2003).

- to support the child building his fantasy and world model, the elaboration of the understanding process through *discussion* and *cooperation*.

- *an environment should sustain and enhance this discussion between children and between children and adults and should contribute to support the cooperative mechanisms.*

- to help the child to become more 'metacognitive', to be more aware and conscious of the way he learns, thinks and organizes his experience and negotiate meaning by narrative.

- *to provide the child the opportunity to develop his metacognitive abilities.*

2.1.3 Narrative structures

2.1.3.1 Occidental narrative structure

In the Western culture children meet the expectation of what is a "good story" when they tell their listener who and what is involved, and when things take place. They also must build a series of events up to a high point, and conclude with the resolution (Labov, 1972). We will come back to Labov in section 2.

Despite some variations, there is considerable agreement on the minimally acceptable characteristics of the structure for single episode stories (Hudson & Shapiro, 1991). A first orientation clause is situated at the beginning of the narrative and gives the context (main character and place). A second one introduces new characters and prepares new events. Initiating events are goal-directed actions. It follows a problem or obstacle to achieve the intended goal;

then comes the resolution of the problem and a formal ending device ("the end"; "they all went home"...).

To illustrate this lets take a story created by a group of seven 5-6 years old children in a Belgium school :

Golden Curly Hair and the magic ring

“Golden Curly Hair goes to the library. While falling through toilets, she falls into a trap. She was looking for a ring. She found it among jewels. But the ring was magic. The witch transformed Golden Curly Hair, she put her inside the ring. Mummy’s Golden Curly Hair with the magic ring. She heard her daughter: "Mummy! Mummy! I’m stuck! Help me!" The mummy with the ring, Golden Curly Hair is inside. The mummy is going to see the witch to liberate her daughter. The witch accepts to leave Golden Curly Hair. Golden Curly Hair found again her family”.

Propp (1928) discovered a unitary structure in magical fairy tales given by two types of constant elements, actions and characters. The names of the characters and the way of making actions may change but the actions themselves ("functions") are always the same. Moreover, actions always follow the same order, giving to the story a logical and a chronological order that makes stories predictable.

Through the study of Russian magical fairy tales, Propp (1928) discovered a unitary structure. Indeed, fairy tales include some depth elements (hypothesis of invariance: elements which don’t vary from a story tale to another: prohibition, violation, damage, supply of magic object, etc.), allowing to create some abstract categories.

Propp identified two important notions (constant values):

- the notion of function (i.e. the minimum unity of narrative which corresponds to an action) and
- the notion of character based on its possible actions.

In the field of inventive literature, this narrative model is considered a powerful, predictive instrument and a mean of rationalisation but that can not be applied out of magical fairy tales. Propp individuate 31 possible functions,

actions that characters may accomplish, such as: prohibition, break of prohibition, damage, provision of the magical object, etc. An important feature of functions is that they always appear in the same order; even if there is no tale in which we can find all of them.

Regarding the characters, Propp identified seven roles obtained by connecting classes of characters with the actions they may accomplish. Each role-character may act only inside a certain number of functions. All functions constitute the field of action; so, it is possible to attribute some fixed actions to each role. In particular, the roles individuated by Propp are: the antagonist, the donor, the helper, the princess and the king (her father), the sender, the hero, the false hero.

The fundamental narrative criteria is to create a tension and to resolve it. The only function that is always present in fairy tales is the damage; it makes the narrative mechanism starting and it primes several events, which conclude with the equilibrium of the initial tension.

This way of considering narratives has been developed by Greimas who claimed that a narrative text is a machine which transforms actors thematic roles, by transforming them from poor to rich, from prisoners to free men, etc. Many times, together with thematic roles, the text puts in evidence the transformation of feelings ("pathemic" roles), in fact we can assist to the modification from sad characters to plenty of joy ones, from indifferent characters to passionate ones.

The models proposed by the semiotic approach of narration are representative of a particular culture, in this case the western one. The narrative structure indicated by Propp is explicitly taught at school, even though in a simplified version. Therefore there is a strong social and cultural influence in the way children learn to build a "good" story.

Indeed, teachers we met in Italy and in Belgium (Cioni et al. 2000) explain to children that fairy tales take place at a certain time and in a certain place. They may be segmented in different parts, the beginning, the central moment (or moment of change) and the end. In this vision fairly-tales always involve particular characters (the protagonist, the antagonist, friends and helpers of the protagonist, etc.) and actions.

Learning this particular narrative model is part of the pedagogical objectives teachers want to achieve. It includes:

1) learning to understand and to represent story (tales) using a temporal scheme;

2) learning to individuate and to recognise characters, places/environments and situations of a fairy tale.

2.1.3.2 Narrative structures as cultural products

Children's stories are cultural products and their forms differ from culture to culture. A good story for one storytelling tradition is not necessarily a good story for another one.

The study of children's stories among various cultures demonstrated the absence of a universal grammar of narratives. Indeed, narrative structures differ from one culture to another.

Studying development over a range of ages and ethnicity's has lead McCabe (1997) to propose a broad and not culturally biased definition of narrative: "Narrative is a linguistic cross-road of culture, cognition, emotion and serves the dual functions of sense-making and self-presentation".

McCabe's studies have shown that American children, around 6, have developed the kind of oral narrative preferred by their culture, in general, and by their family, in particular. They give an abstract of what they will talk about. They refer to a set of events with a culminant point they evaluate. Then, they explain how the problem gets solved. But this kind of narrative (called "classical story") is not necessarily the one elicited and preferred in other cultures.

Japanese children do not organise their narratives around a singular plot but they combine in a same story similar events which occurred at different moments and places even when they are asked one specific event. They show regularity in the number of lines given to each topic. This kind of structure can be assimilated to the Japanese poems "Haiku".

Afro-American children talk mostly of their past experience developing longer stories than European (American). They combine similar experiences in one story unified by a topic, improvising on a theme. Some of these children tell "topic-associating-story", narrative that are organised around a series of implicitly linked anecdotes or episodes happening at different times to different people and that does not adhere to a simple linear pattern of organisation.

Portorican children, instead, have a distinct narrative style often not understood by persons who do not share the same cultural background. They do not tell sequences of actions as other children do but they focus on descriptive information often related to members of their family and their personal relationships.

Narrative structure may also differ within a same culture. For instance, the taste of European and European North American for detailed descriptions has evolved with time and are not appreciated anymore as it was in Victorian times. It should also be acknowledge that within the label of culture such as European-American, Afro-American stands different sub-culture that might affect narration.

Children's narrative is the result of a specific socialisation process. "Storytellers are made not born". Children acquire the capacity to produce monological stories by anticipating parents' comments or questions. Parents' guidance into narrative is quite specific: their types of interview predict how the children will use later on some narrative components with other people. The various storytelling traditions shape children story forms through the pattern of elicitation proposed by the parents when children build stories. For instance, Japanese mothers ask less questions on the "who", "when" and "where" compared to American mothers. Japanese mothers ask questions more frequently to their child, which aim to shorten her/his contribution. Indeed, verbosity in the Japanese culture is avoided as much as possible because it insults listeners and embarrass narrators.

Parents' pattern of elicitation of stories varies not only from culture to culture but also within one culture and these patterns shape the way in which

children tell stories. For Instance, McCabe, within American families, has found a general correlation between the production of children “classic narration” and the extent of topics proposed by their parents. The more parents expose their children with a great variety of topics, the more children produce "good stories".

More specifically, when parents encourage their children to build stories, they stimulate differently questions on thread or on description of the "who, what, when and where". According to the input given by parents, children will spontaneously include this kind of information with other persons later. Moreover, it has been demonstrated with American children that the introduction of orientation elements (who, what, where, when) are linked to school success.

Concerning narrative components such as causality, McCabe showed that the way in which the parents include psychological motivation of the characters with their children predicts the way children will include this information in their story with other adults. There is a correlation between the causal language of the mother and the use of this type of language of the child, one year later. Reported speech analysis have shown that children whose parents pay more attention to reported speech, talk more spontaneously of past events in their narratives elicited by experimenter.

These results can be easily related to the Vygotskian notion of Zone of Proximal Development (ZPD) that stands for "what the child can do today in collaboration, he/she will do it later alone". Children build their story (narrative structures) by anticipating the questions and comments they received previously. For instance, the more they are asked to respond to orientation questions "today", the more they will introduce spontaneously in their stories orientation elements "tomorrow".

2.1.3.3 Educational framework

McCabe showed that children and adults from a non-European narrative tradition may find some problems to understand and remember written stories from other traditions. This is also true in the opposite direction: children of European culture find difficult to understand, and even recognise as “stories”, narratives from other cultures.

In United States, most teachers are from a European background and they bring consciously and/or unconsciously their own narrative tradition in their teaching. Often it happens that children tell or write stories that do not respect teachers' expectations of what is a good story and are therefore misjudged.

Children from different cultural background can misunderstand each other. Indeed, they may create false judgements of others based on their discourse style. These differences highlighted in the narrative tradition may play an important role in misunderstanding the others.

The issues concerning the differences on narrative traditions must be submitted to the large educational system. McCabe proposes some solutions applicable in the American context: one way to deal with that issue would be to implement a multi-cultural curriculum that would expose each child to the stories of the main cultural groups in US. This exposure should not be superficial but should be supported by an important exposure to the culture itself. Otherwise the effect might be negative rather than beneficial.

A multi-cultural curricula would challenge all the children from different culture at the same time. In such curricula the teachers would provide the children with the required background to make the stories comprehensible. They should elicit and explicitt the values and the structural forms of the stories from various cultures.

Teacher should open up the definition of what they consider a good story (i.e. with a beginning a middle and an end, with a problem and a problem solving). For instance, sequentiality is present in every teacher's manual but this ability is specific to the European tradition.

At a more general and ethical level, McCabe raises also very important questions: should the teacher try to modify the narrative structure of the pupil from a non-European toward a European structure? Indeed, giving explicit instructions on the grammar of story improves the comprehension of stories with European forms.

There is less evidence showing that teaching the European model improves the production of children which are not centred on problem solving. Neither there is evidence that teachers can teach students with European background on conventions not related to a non-European production.

Narrative is a tool to organise experiences and knowledge. Thus, providing children with a broader range of narrative structures give them opportunities to explore aspects of reality they could not have conceived only with their own cultural instruments. This can be directly related to the first pedagogical objective inspired from Vygotsky's statements.

In addition, if a multicultural curricula would provide together with narratives enough knowledge and experience of different cultures, children could get really closer to the "other's mind", to understand their emotions, wills, and intentions. This encounter the 4th objective stated from Bruner's assumptions.

The European educational system has of course to transmit children's own narrative tradition and structure for them to be adapted to their culture. And this is already provided to children through the existing curricula. But it should also give children the instruments to understand stories from other cultures.

2.1.3.4 Opening up the avenue of narrative structures

From our perspectives narratives structures should be enlarged considering two main aspects:

1) the cultural aspects of narratives as we previsously see.

2) the various means of expression

Constructing stories is a type of playing that involves mobilizing the storyteller's imagination and finding original ways to convey narrative intentions. When a child invents a story, there is a natural interaction with the local environment. The activity involves implementing various means of expression. Whether in class or out, the object is to invent a story based on observations of the seasons, develop a comic situation involving two people or to touch an object collected during an outing. Through storytelling children learn to express themselves and make sense of the external world. As Bruner (1996)

points out, developing narrative skills is for children the privileged and primary way to enter in the culture.

Narration enables to develop various capabilities, but it is also the opportunity to play a game that combines a number of sorts of expression. Our numerous observations on narration mechanisms of 6 to 8 year olds, inside and outside of school, have showed us that children use a wide variety of means for constructing stories (Cioni & al. 2000, Decortis *&* *al*. 2001, Decortis *&* *al*. 2002). While most narrative activities are centered on verbal production, the story is often enriched with other media, such as drawing, theatrical staging, but also sound, music and body expression. In school, the acquisition of narrative skills provides children with the means to express themselves and successfully accomplish their storytelling intentions. One of the criteria for evaluating the acquisition of this skill is the capacity to use these various means of expression to structure story contents.

Narration can be envisaged in various ways. On one hand, we can focus on the process of story construction, on what we have called narrative activity (Decortis *et al*. 1999). Or we can focus on the product of this activity, i.e. the story as such, which is characterized by a story's structure (Decortis & Rizzo, 2002).

In our point of view, a better understanding can be achieved by anchoring our analysis in two concepts: the way in which narration expresses logic, time and space (Bordwell, 1985) and the visual dimension of narration (McCloud, 1999). This is what we will develop hereafter.

2.2 Non-linear means of expression

Narrative is a specific activity that children learn to negotiate through social transactions, through interacting with parents and through education. One criteria of a good story used by school teachers is the presence of "good structure".

Structuring a story is considered the pivotal feature of a child's narrative skills, and development of those skills is an important goal of education.

In this part of the deliverable, we want to explore some theoretical aspects of narration grounded on our observations which are the complements of a socio-cultural vision of narration.

Initially, we describe the theoretical approaches that enrich narration, how they rely on various existing narrative media and the specificities of those media. Is it possible to tell stories by simultaneously or separately using verbal, visual and sound? If so, how?

The motivations for these choices are found in our observations of narrative activity in children age 6 to 8. These observations show that children use many and varied means for telling stories. While most of these activities focus on a **verbal approach, the stories are often enriched with drawings, playacting, but also music and corporal expression**.

As teachers point out, in order to gain narrative skills children have to acquire the "means to express their intentions", and one of the criteria for evaluating their level is the ability to use these various means to structure the content of their stories.

On the other hand, teachers also repeatedly emphasized that new technology should expand the child's potential for expression and a large part of their expectations regarding POGO revolve around this aspect.

"The child has to be able to add (to his drawings) a sound environment, which is not possible in a notebook". "The use of new tools should provide a multisensorial dimension: add sound, pictures…".

One of our major objectives became the introduction of means of expression that are currently unavailable. Among our suggestions to POGO designers, we insisted on the possibility of capturing and using sound, of creating and introducing pictures in various media. In the end, the POGO environment enables children to combine traditional production (drawings, text, verbal elements, etc.) with other components of expression.

A credible base of past research strengthens any new approach, and we believe the following theoretical frameworks offer interesting insights for our work:

(1) In terms of ***verbal narration***, the elegance of its formulation and the simplicity of its theory make the work of the sociolinguist William Labov a basic reference for any research in the field of narrative analysis. Although conceived for modeling oral narration, this theory identifies a story's structural categories in a way easily transposed to analysis of fictional stories produced by school children.

(2) ***Visual narration*** comes into play at the level of individual scenes as well as in their time sequences.

– The concept of composition, framing and related filmmaking activities provide us with tools for understanding the various choices available when constructing a image, and the consequences in terms of narration.

– On the other hand, analysis of comic books, particularly the work carried out by the American artist Scott McCloud, identify the basic mechanisms that govern segmentation of action and linking of images in a narration sequence. By combining these two approaches, we can arrive at the interpretive categories needed to analyze the visual components of children's stories, on the level of paradigm and phrasing.

(3) In his work on film narration, Bordwell constructed a complete interpretive framework for the expressive possibilities offered by this medium, both in form and content. There are two reasons why the approach is pertinent. On one hand, the cinema is a very rich medium, which dynamically combines sound and image. This is why we believe the analysis of strategies used in this field is fundamental to understanding the potential of multimedia narration. On the other hand, Bordwell's constructivist approach, inspired by Russian formalists, offers a general model of narrative structuring and the statistical means for constructing various types of stories that children might produce.

(4) Our last theoretical support specifically involves sound and its use in radio drama and films. The various techniques that exist for sound narration and their implications on the structuring of a narrative appear to us to offer a particularly interesting opportunity to use new means of expression.

2.2.1 Oral Narration : Labov's classic model

Labov (1972) and his coworker (Labov and Waletsky 1967) use a sociolinguistic-type approach. It is based on the analysis of the formal and structural properties of stories in relation to social functions. The stories examined are oral narrations of personal experiences. The categories identified are framed as answers to real or hypothetical questions asked by the questioner.

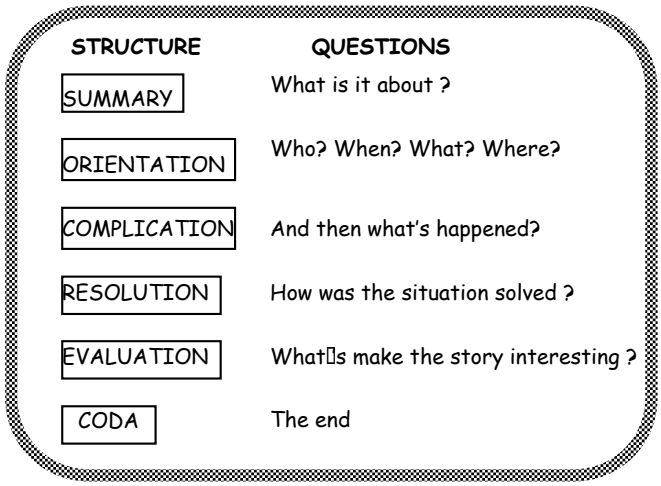
According to Labov, the oral story is composed of six parts: summary, orientation, complication, evaluation, resolution and "coda". The actual narrative parts are the complication and the resolution. The "complication" corresponds to the chronological description of the events, up to the crucial moment of the story, and it answers the question "what happened?" The "resolution" is the part where the problem is resolved, it consists of the final events of the story and it answers the question "how did it end?" Labov calls these parts "the narrative", because they are made up of propositions that are linked to one another in a precise chronological order. Their positions cannot be exchanged without affecting the semantic interpretation of the text. Labov considers the "temporal junction" or the non-reversibility of two propositions to be the constitutive element of a narration. His basic idea is that the presence of this relationship is an essential condition if we want to speak of a narrative.

Labov defines the other parts as evaluations that are not dependant on the chronological order of the propositions. The "summary" gives a glimpse of the story's subject by answering the question "what is it about?". The "orientation" provides contextual information on the participants, the place and the time of the events (who, what and where?). The "evaluation", which is usually included in one of the other categories, is the answer to questions concerning the narrator's point of

view (what is the interest of the story?), and serves as a commentary on the narrated events. The "coda" is a formal conclusion that signals the end of the story, and returns the storyteller and the public to the present.

According to Labov, the only essential component of a narration is the "complication", which must have at least two chronologically ordered propositions. The set of six parts defines a complete story.

Labov et Waletsky (1967) posit that oral narration of personal experiences constitute a basic source of understanding of the structure of more complex narration found in literature as well as in oral tradition. This implies that the macro-structure that they identify is a model useful for all types of story. Its emphasis on solving problems and on chronologically linking events makes it a canonical model of narration in western culture.



Labov's macro-structure (1972)

2.2.2 Narration through pictures

2.2.2.1 Cinematography

Cinematography (see Souto, 1971 ; Arjon, 1989 ; Aumont, 2000), with the concept of "framing", offers a appropriate tool for analyzing how images are

constructed in a narrative. The classifications found in this discipline refer to the cinema tools and techniques, but they can be applied to all sorts of visual narration.

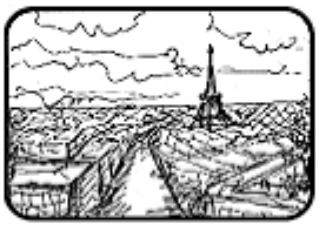
Framing consists of using the camera to compose the desired view of images, and includes:

- The size of the subject in relation to the overall image, which is determined by the distance of the camera from the subject. The classification of camera distance varies from "long shots", shot from a great distance, to close-ups, which show individual parts of the subject, like the face or the hands. The most frequent intermediate distances are the "full frame", showing completely visible individuals in a recognizable environment and the "close-medium shot ", which is relatively far from the subject but is less focused on the background.

- Camera angle (or angle of the shot) is determined by the camera position in relation to the subject. The shots may be horizontal, high angle (camera above the subject) or low angle (camera below the subject).

- Subject angle, which is defined by the position of the subject in relation to the camera. This can be front, three-quarters or profile shots.

Shooting angles in cinema not only offer various aesthetic possibilities, but also produce different narrative effects. The size of the subject influences the amount of information conveyed. Long shots are often used to establish where the action is going to take place (a city, for example). Full frame shots focuses attention on the environment and the setting. The close-medium shot is used for the interaction between two characters, and the close-up for a certain object or an expression of a character. The camera angle mainly influences the dramatic and psychological aspects of the story. A low angle shot can evoke a dramatic situation or render a character haughty, perhaps dominating, whereas a high angle is often used by directors, such as Hitchcock, to create suspense and mystery. The subject angle mainly influences the depth of field: more depth in three-quarters, a flatter picture with less depth in front shots.



Long shot

Full frame

Close medium

Close up shot

Dimensions of the subject

2.2.2.2 Scott McCloud: Comic books

Scott McCloud developed a theory that explores the visual dimension of a story. In his work on the comic book (1999), he introduced a particularly interesting concept for analyzing narration in the form of images. According to McCloud, closures segment the flow of events into separate units. The complexity involved in reconstructing the continuity of these fragments depends on the quantity and quality of the information that remains implicit between one scene and another. The greater the number of leaps of logic, time and space ("ellipses") between two segments, the greater the effort necessary to interpret that part of the story.

According to Mc Cloud's classification, the panel-to-panel closures that we most often find in the comic books of western culture are categorized as "action-to-action". This type of link, where two scenes representing the same subject(s) in separate consecutive actions, does not require much use of ellipsis. The sequence of panels creates a linear continuity of cause and effect that reflects the main organizational principle of storytelling in western culture: causality.

Another fairly frequent link is "**scene-to-scene**". In this case, panels break down an action sequence by using greater leaps of time or space, producing an ellipsis that demands a major effort to interpret.

The third type of link that plays an important role in the storytelling of western culture is the change of subject within the same situation or idea. As in scene-to-scene, this type of transition, called "**subject-to-subject**", requires deductive logic to link the two scenes.

Among the least common links are "**moment-to-moment**" and "**aspect-to-aspect**". The first shows the two adjacent instants in the action (like an eye open, then closed), and the second is a juxtaposition of different points of view concerning the same place, mood or idea. McCloud attributes a more emotional character to aspect-to-aspect transitions, which depend on a suspension of the story's timeframe. According to McCloud, this type of transition is very rare in western culture, but common in Japanese storytelling, where intervals and contemplation are emphasized in relation to linear causality. McCloud calls his last class the "**non-sequitur**", and it is the least common. It is defined as a transition where two panels apparently have no relationship to one another.

In terms of our work, the value of the concept of ellipsis and its connected elements resides in the way it can simultaneously explain both the cognitive and cultural aspects of the construction/understanding of storytelling through images. The capability of breaking down visual representation of a story in an understandable and varied manner strikes us as an important aspect of image-based storytelling.

Moment to moment
L'enchaînement demande une petite ellipse

Action to action
A unique subject is represented in a progression

Subject to subject
A high implication of the reader is required to be understood

Scene to scene
Significant time and space concatenation

Aspect to aspect
Time no matter but introduce a floating eye on different aspects

No sequitur
No logical relation. Meta closure.

MacCloud's closures

2.2.3 Bordwell's constructivist approach

2.2.3.1 **Fabula,** syuzhet **and style**

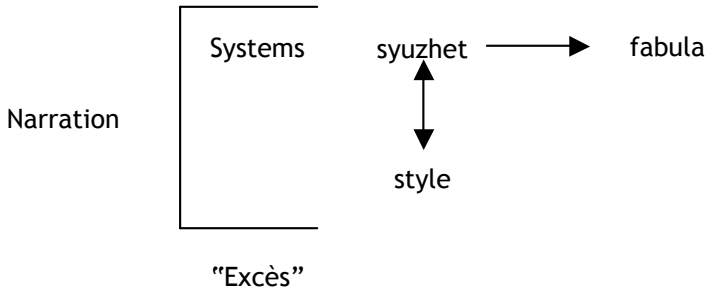
Bordwell constructivist approach (1985) focuses on the interpretive activity of the public as consisting of active inferential procedures.

When we interpret narration, we build logical links between events, and we situate them within a more or less well-defined framework of time and space. According to Bordwell (1985), who builds on the theories of Russian formalists, this inferential approach is guided by clues provided in the narrative. "The imaginary construct we create, progressively and retroactively, was termed by formalists the fabula (…) the fabula embodies the action as a chronological cause-and-effect chain

of events occurring within a given duration and spatial field" (pg 49) (also see Eco, 1996).

This means the fabula is an abstract construct. The plot (syuzhet) is defined as how the events in the fabula are organized, whereas style means the techniques used to build a given plot. In other words, the narration can produce different forms of structural organization (syuzhet) and formal organization (style) in the same linear chain of events (fabula).

Fabula, syuzhet and style constitute three independent systems whose relationships are indicated in the following outline. According to Bordwell, "excess" includes the non-narrative material used for purely aesthetic considerations, for instance: choice of color or a specific sound.



Bordwell (1985)

2.2.3.2 Narrative principles

The relationship between these three systems can be explained by referring to the three organizing principles of narration: logic, time and space.

The fabula- syuzhet tandem's relationship to **time** is defined mainly by the order, duration and frequency of events: the syuzhet organizes the events of the fabula in a particular sequence, assigns a certain duration to each event and presents it a certain number of times.

The **logic** of the story employs a narrative structure that guides the public towards making assumptions on the causal links between events.

The plot can give more or less precise indications on the **space** where the events take place. The nature and depth of the information influences the way that the public interprets the space of the fabula.

While the relationships between fabula and syuzhet are independent of the media used, the expressive elements (style), which can be manipulated to direct the construction of the fabula, are different for each medium.

In cinematographic narration, framing and editing are the two basic means of handling the inferential activity of the spectator. For example, a film can delay or interfere with the correct interpretation of the situation (logic) by hiding part of the scene or postponing a fundamental scene. Radio dramas make extensive use of sound and music to mark the time progression of scenes, to communicate the moods of the characters or their positions (using the voice volume). In comic books (see above), the transition from one panel to another defines the logical, temporal and spatial breakdown of the story.

In other words, according to *Bordwell et Thompson (2000),* we can consider a narrative to be a *chain of events in cause-effect relationship occurring in time and space*" (Bordwell & Thompson [1979] 1993: 65). Causality and time are the two focal points of this definition. A random sequence of facts is difficult to accept as a story. “A man is restless, paces the room, unable to sleep. A mirror shatters. A telephone rings.” This juxtaposition of actions with no apparent causal or temporal links is not normally called a narrative. However, we could fill in the story: “A man argues with his boss. That night he is restless, paces, unable to sleep. The next morning, still angry, he shatters the mirror in the bathroom. The telephone rings: his boss has called to excuse himself for yesterday.” Now, we have a story. The episodes are spatially linked: first the man is in his office; then at home; the mirror is in the bathroom; the telephone is in another part of the house. We understand that these three components are part of a series of causes and effect: the argument with the boss caused restlessness and anger, which led to the destruction of the mirror, which took place before the boss called. All of the action takes place in one evening and morning. The story builds on an initial situation – a boss-employee conflict – and transpires in several episodes, which are consequences, and the story ends with the conflict

being resolved. This simple example sums up the importance of causality, time and space in the narrative form.

2.2.3.3 Narrative modes

Bordwell identifies a number of narrative modes in the history of cinema. They correspond to various sets of "essentially stable and coherent narrative principles employed in a group of historically defined films." (1985; pg 150). "A narrational mode is a historically distinct set of norms of narrational construction and comprehension". This definition is based on the idea of a norm or standard. Each cinematographic product either follows or does not follow a standard made up of a set of canonical principles that characterize and unify most of the previous or contemporary products. Any film that stands out significantly from these standards creates a deviation in the dominant mode. When the same types of deviations are found in a significant number of films, they become new standards and define a new narrative mode. It should be specified that every deviation from the dominant style is not necessarily a new narrative mode. As Bordwell points out, within a given motion picture production there are minor variations that reflect the individual style of the filmmaker and that does not compromise their membership in a given narrative mode. Another precaution involves the very nature of the standard. Rather than imposing an unequivocal solution, the standard consists of a series of different possibilities that correspond to the same narrative principles. According to Bordwell, the standard is a paradigm: it defines "a limited set of alternatives that, at a certain level, serve equivalent functions." (*op. cit.* pg 151). Before citing examples of the nature of these functions, we think it important to emphasize several interesting aspects of this approach. The first is the attention paid to the active aspect of understanding a story. The concept of a standard pertains not only to the production, but also to the interpretation of the film. The expectations of the spectator are determined not only by the spectator's general knowledge of the world (schemata) but also by the conventions learned from that spectator's prior film experience. The second consideration involves the value of this approach in relation to narration in general. While the style of each medium develops its own system of

conventions, the fabula and plot of narrative modes have a much larger range of application. The modes identified by Bordwell in the history of cinema correspond to general narrative styles that can be found in various media, such as Classical Narration and Art-Cinema Narration, Historical-Materialist Narration (with the Soviet example) and Parametric Narration. We are only going to present the two major modes: Conventional Narration and Art-Cinema Narration, and we will call the latter of those two "expressive" narration.

2.2.3.3.1 Classical Narration

Classical Narration has become the dominant narrative mode in western culture. From Aristotle until now, this concept of storytelling has secured its place as the most familiar, common and intuitive mode in our culture. In the realm of cinema, Hollywood films are the representative expression.

Classical Narrative presents psychologically well-defined characters involved in solving a clearly established problem or pursuing a precise goal. During the story, the characters confront difficulties and enter into conflict with other agents. The conclusion consists of solving or not solving the problem, or of accomplishing or not accomplishing the initial objectives. The narration concentrates on the psychological traits of the characters, and particularly the protagonists, who become the causal agents, the driving forces of the action.

In terms of the fabula, the characteristics of this narrative mode are causality focused on the character and action defined as pursuing an objective. The plot is constructed to demonstrate the causal links between events. The story will guide the public towards an unequivocal interpretation of the facts. Even if it temporarily prevents understanding by hiding the logical links between facts (as in the detective genre), it always ends by filling in the empty spaces.

Time manipulation techniques, like the flashback, are used, for example, to provide this type of information, but there is an unequivocal presentation of the facts; the memory of the characters is generally objective and unequivocal. Space is most often organized to further the construction of the fabula. The places and the objects shown not only correspond to the criteria of realism, but often also provide keys to the logical reconstruction of facts. For example: to anticipate a future action (showing a telephone before it rings), or to focus the public's

attention on a significant aspect of the story (a calendar that focuses attention on a specific date).

The style used in classical Hollywood film is usually rather "invisible" and conventional, "subservient" to the communication of information necessary to construct the fabula. This means that classical narration rarely includes the filmmaker's involvement, other than in efforts motivated by the needs of the story, or finalized in purely aesthetic effects.

2.2.3.3.2 Expressive Narration

An important alternative to the classical model is what Bordwell calls "Art Cinema" narration, which we will more broadly refer to as "expressive narration". This is a development historically rooted in European avant-garde film. In an intertextual perspective, this narrative mode involves not only the cinematographic production, but also literature, theater, and so forth.

A central element of this type of narration is the use of a subjective and multiple visions of reality, as opposed to the objective and unequivocal vision of classical narration. As with literature in the beginning of the twentieth century (see Joyce, Hemingway, Tchekov, etc.), reality is not understandable and static, governed by chains of events in cause-effect relationships, but instead ambiguous and open to interpretation. This basic assumption is manifested in the expressive mode's interest in the psychology of its characters. Instead of having defined objectives, the protagonists in these stories question themselves, develop and question their existence. The narration brings into play their states of mind, represents reality through their eyes and their emotions. Subjectivity plays a pivotal role. Another feature is that the filmmaker explicitly intervenes. As Bordwell points out, the narration is frequently aimed at destabilizing the public by using procedures that tend to show that a cinematographic event is an artificial construction, simply one of the possibilities for representing an intangible reality.

These principles of the expressive mode transform the plot into a series of narrative strategies that differ greatly from those of the classical mode. Namely, they weaken the causal links between events. This leaves the spectator with a large margin of freedom in the construction of the fabula. The narration is often

episodic. Events do not line up in a series of causes and effects, but follow one another with no apparent logic. Contingency and randomness often take the place of cause and effect. Some of the information necessary for reconstructing a linear and causal chain of events is left out or hidden. The spectator is often left facing permanent ellipses.

The duration of the events may be left undetermined. Rather than having recourse to time keys (calendars, watches, etc.), the rhythm of events is guided by the psychological states of the characters and by subjective timeframes. The filmmaker structures timeframes with partial flashbacks (only part of the information necessary for construction of the fabula is shown), flashforwards (the plot shows a future action of the fabula), and sometimes ambiguously alternates "objective" representations of past events along with the memories of the characters.

The space is portrayed can also be motivated by the psychological states of the protagonists, becoming a projection of their state of mind.

In the realm of filmmaking, the stylistic means employed to achieve these ends are many and varied. Art Cinema invented a whole series of expressive spatiotemporal effects to represent emotions, dreams, subjective visions, etc. The effects make use of variations in light and sound, nonsimultaneous sound, stationary shots, long-duration shots, emotional landscapes, etc. Directors operating in this mode have developed their own personal systems of style, which further emphasizes the role of the filmmaker in the narration, and makes it easy to recognize his/her particular manner of constructing a cinematographic reality.

2.2.4 Sound narration

Sound is a particularly important narrative component in cinema and radio. Sound design is a discipline that involves the use of sound in these fields.

Many different classifications have been developed to describe the way sound can be used in film narration or in radio drama.

1) The first involves the nature of sounds, the objects of sound design. Narration through the use of sound encompasses:

- Dialogues: voices of the characters
- Sound effects: produced artificially or recorded in nature
- Music
- Silence

2) Another basic distinction from the point of view of the narrative is sound which does or does not make reference to the story space.

- A **diegetic sound** has its source in the interior of the story space. Examples of diegetic sound are the actors' voices, sounds produced by objects in the story, music that is portrayed as coming from instruments in the story, etc.

- A **nondiegetic sound** is one that comes from a source outside of the story space. Some examples would be the commentary of a narrator, sound effects added to produce a dramatic effect and mood music.

One particular case is "emotional realism", where diegetic sound is charged with emotional impact in order to portray the psychological state of a character or to interpret a dramatic moment in the story (for example, a syncopated rhythm or increasing volume).

The distinction between diegetic and nondiegetic sound depends on our understanding of the conventions of film and radio narration. A text can play with these conventions to create ambiguity (horror) or surprise (comedy).

3) Some of the uses of nondiegetic music include:

- The "music curtain", which introduces and segments different scenes, or concludes a story.
- The "music bridge", which marks the transition from one scene to another.
- The "sting", a sound (typically a single note) that interrupts a phrase, providing emphasis on an important part of the dialogue.
- The "music bed", which serves as a backdrop for the voice of the person who is speaking.
- The "music theme", signaling, associated with a person or a situation that recurs in the story.

4) Other distinctions can be made:

- between "**literal"** or "**realistic** », those sounds perceived as such, and "**non literal**" or "**nonrealistic**" sounds, used to suggest an event for which there is no realistic sound (for example, the appearance of a ghost) or to obtain a particular reaction from the spectator.

- between "**background**" and "**foreground**" sound. Background sound or mood music define the acoustic space where the story's events unfold, whereas foreground sound typically consist of the actors' voices.

- Between "**discrete**" sound that relates to individual events and "**continuous**" sound.

In order to understand the importance of the acoustic element in the narration, it is perhaps interesting to compare the role of sound with the main narrative modes identified by Bordwell, and to see how this element can be used to guide the public towards the construction of the narrative logic, time and space.

Logic. Sounds can provide clues to the public, which is trying to construct causal links between events:

- by representing an event through the sound it produces (naturalistic sounds)
- by suggesting the mood of a character (mood music, emotional realism)
- by attracting attention to a crucial moment in the narration (sting)
- by anticipating an event (musical theme)
- by evoking an emotional response in the public

Time. Sound can be used:

- as a syntactical element that structures the time dimension of the story (music curtain, sound bridge)
- to give rhythm to the narration
- to provide clues for identifying the time or the story that is taking place (mood music)

Space. Sound can influence the spatial dimension of the story:

- by portraying the environment where the story is taking place (atmosphere)

- by using techniques for manipulating sound (volume, etc.) that suggest the positions of the characters and objects, as well as their movement from one place to another (point of view, background and foreground positions)

2.3 Discussions of section 1 : Implications for technology learning environments

We believe that the socio-cultural framework contributes to define a vision on narrative and to derive orientations to technology enhanced learning environments. They can be summarised as follows:

1. Expand as much as possible the sensorial experience of children within each type of relationship: e.g.

I Imaginary relationships between real elements,

II Real relationships between real but not experienced elements;

Allow comparison and experimentation among the relationships I and II. Stress the social origin of relationship II.

2. Allow children to develop emotional knowledge (e.g. empathy) through the law of the common emotional sign and the law of reality of imagination.

3. Allow children to complete the circle of creative imagination that started from sensorial knowledge of reality and that has to go back to reality through the active modification of the environment produced by the embodiment of the imagination.

4. Develop children abilities to understand others' emotions, intentions; wills and beliefs, to understand "other's minds" (intersubjectivity).

5. Develop children metacognition

These pedagogical orientations constitute a corpus of aims that are mutually supportive and that are at the core of many innovative practices of literacy education. Both the Italian and Belgian schools that we know are at the forefront of these advanced education practices. In some cases, computer-based technologies are used to support educational activities at school, but unfortunately the available digital technology violates most of the principle stated by the proposed pedagogical objectives and for this reason it is often relegated to a marginal role. Obviously, this is not due to the nature of the technology, but to the way most of current digital technology is designed.

The first limitation of the current technological tools is the fact that learning is separate from -- and to some extent opposed to -- any other activity in everyday life. According to this design view, not only do we learn mainly in certain periods of our lives, but our learning is restricted to specific occasions, such as when we take a class, or play a CD, or watch an instructional video. However, this is an inaccurate description of how matters stand. Study and instruction "per se" are indeed important, but learning is also deeply rooted in other everyday activities and experiences as well. Most of the relevant know-how that distinguishes an expert from a novice is acquired on a day-to-day basis by acting, reflecting and day-dreaming.

Another limitation of technology is that it is mainly mono-sensorial. Visual stimulation is the predominant vehicle of interaction with technology .and the other senses are dramatically cut out. This mono-sensorial modality of interaction is unnatural and violates one of the proposed pedagogical objectives: "to let the children experience and express as much as possible through the different sensorial modalities".

In the third place, the view of learning as a totally individual activity is misleading. Learning is much more than, and very different from, finding and acquiring items of structured knowledge. In everyday life as much as in work organisations, people and groups create knowledge negotiating the meaning of words, actions, situations, and material artefacts. They all participate and contribute to a world including the personal sphere as well as the working environment, which is socially and culturally structured and constantly

reconstituted by the activities of all those who belong to it. Cognitive and practical activities can thus be pursued only within this world, and through this social and cultural network. Knowledge is not what resides in a person's head or in books or in data banks. To know means to be able to participate with the requisite competence in the complex web of relationships among people and activities. From this definition, it follows that learning is always a practical accomplishment. Its goal is to discover what to do, when and how doing something by using specific routines and artefacts, and finally to provide a reasonable account of why a certain activity has been done. Learning, in short, takes place among and through other people.

2.4 References

Arjon, D. (1989). *Grammaire du langage filmé*. Paris: Gallimard.

Aumont, J. (2000). *L'image*. Paris: Nathan.

Bamberg (1997). Narrative development : six approaches.Lawrence Erlbaum, London.

Bordwell, D. (1985). *Narration in the fiction film*. London: Routledge.

Bordwell, D. et Thompson, K. (2000). *L 'art du film. Une introduction*. Bruxelles: De Boeck Université.

Brown, A. L., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A., & Campione, J. C. (1993). Distributed expertise in the classroom. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 188-228). New York: Cambridge University Press.

Bruner, J.S. (1990). *Acts of meaning*. Cambridge MA: Harvard University Press.

Bruner, J. (1996). *The culture of education*. Harvard University Press, Cambridge MA.

Cioni, S., Daele, L., Dumoulin, JM., Decortis, F., Fusai, C., Marti, P., Petroni, L., Polazzi, L., Rizzo, A., Saudelli, B., Save, L. (2000). *Narrative and learning, school studies*, POGO/ULG-USiena/pm-fd/00001/v1 .

Decortis, F., Fusai, C., Marti, P, Mouffet, D., Petroni, L., Polazzi, L., Rizzo, A. Sanchiz, F. Saudelli, B., Torsi, S. (1999). POGO - *Theoretical framework Narrative & Learning*, POGO/ULG-USiena/fd-pm/99001-v1, 15 juin 1999.

Decortis, F., Rizzo, A., Daele, L., Polazzi, L., Saudelli, B. (2001). Nouveaux instruments actifs et activités narratives. Pogo : vers un espace de création située. *Revue d'Interactions Hommes-Machines*. Vol 2 N°2/2001, 1-30.

Decortis, F. & Rizzo, A. (2002). New active tools for supporting narrative structures. *Personal & Ubiquitous Computing*, 6, 416-429.

Decortis, F., Marti, P., Moderini, C., Rizzo, A., Rutgers,J., Thursfield, P. (2002). Usages et conception d'instruments actifs pour la créativité narrative. *Les Cahiers du Numérique*, 3, n°4, 127-148.

Decortis, F., Rizzo, A., Saudelli, B. (2003). Mediating effects of active and distributed instruments on narrative activities. *Interacting with Computers*. 15, 6, 801-830.

Eco, U.(1996). *Six promenades dans le bois du roman et d 'ailleurs*. Paris: Grasset.

Fusai, C.**,** Saudelli, B.**,** Marti, P.**,** Decortis, F., Rizzo, A. (2003), Media composition and narrative performance at school. ***Journal*** *of Computer Assisted Learning*. 19, 2, 177-185.

Feldman, C.F. (1991). Oral metalanguage. In D.R. Olson & N. Torrance (Ed), Literacy and orality. Harvard University Press, Cambridge, MA.

Labov, W. (1972). *Language in the inner city*. Philadelphia: University of Pensilvania Press.

Labov, W., Waletsky, J. (1967). Narrative analysis: oral versions of personal experience. In J.Helm (Ed.), *Essays on the verbal and visual arts*. Seattle: University of Washington Press.

McCabe, A. (1997). Cultural background and storytelling: a review and implications for schooling. *Elementary School Journal*, 97 (5), 453-473.

McCabe, A. (1997). Developmental and cross-cultural aspects of children's narration. In M. Bamberg (Ed.), *Narrative development: six approaches* (pp137-178). Mahwah, New Jersey: Lawrence Erlbaum Ass.

McCloud, S. (1999). *L'art invisible*. Paris: Vertige Graphic.

Propp, V. (1968). *Morphology of the Folk Tale*. 2nd ed., rev. and ed. with pref. by Louis A. Wagner. Introd. by Alan Dundes. Austin: University of Texas. (First Engl. ed. 1958. Translated from Morfologiia skazki. Leningrad: Academia. 1928.)

Ricoeur, P. (1983). *Temps et récit*. Paris: Seuil.

Rizzo, A., Marti, P., Decortis, F., Rutgers, J., Thursfield, P. (2003). Building narratives experiences for children through real time media manipulation : POGOworld. In M.A. Blythe, A.F. Monk, K. Overbeeke & P.C. Wright (eds). *Funology : from usability to enjoyment*, chapter 15, 1-12, Kluwer Academic Publishers, Amsterdam.

Souto, H.M.R. (1971). The technique of the motion cinema camera. New York: Communication art book.

Stock, B. (1983). *The implications of literacy*. Princeton University Press, Princeton, NJ.

Vygotsky, L.S. (1972). *Immaginazione e creatività nell'età infantile*. Roma: Editori Riuniti.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1981). The instrumental method in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp.134-144). Armonk, NY: M.E. Sharpe.

Vygotsky, L. S. (1986). *Thought and language*. A. Kozulin (Ed.). Cambridge, MA: MIT Press.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Wertsch, J. V (1994). Mediated action in sociocultural studies. *Mind, Culture, and Activity*, 1, 202-208.

Wertsch, J. V., & Stone, C. A. (1985). The concept of internalization in Vygotsky's account of the genesis of higher mental functions. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives* (pp. 162-179). New York: Cambridge University Press.

3 Section II

Structure and Affordances of Narrative for Learning Environments

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3.1 Introduction

A constant presence in the lives of every generation is narrative. We grow up and live surrounded by stories, therefore narrative comes as a natural tool to computer applications. In fact, stories have featured a wide variety of computer applications in different research domains such as interactive drama (e.g. (Laurel, 1993)), computer-games (e.g. The SIMS, Shadow of Memories) and intelligent learning environments (e.g. Puppet, Kidstory and NICE projects). This chapter intends to study the application of narrative in learning environments, as this approach is proving to be not only natural but also efficient. The use of narrative provides a friendly environment, hopefully for setting up social relations, promote affective interactions and ease the analysis of what happened in the story, by means of reflection. Narrative techniques are

expected to introduce advantages in the creation of learning environments due to the significance of narrative in our lives.

The use of narrative for learning includes also multimedia systems, where narrative can be used as organizing principle of the content knowledge presented. Narrative, here, helps the learner overcome the fragmentation of thought implied by the hypertextual structure (Luckin et al., 2001). In this case, narrative not only contributes to structure the content at a fine level (micro-narrative, that is, a single narrative representation, such as a video), but also helps the learner, while using a multimedia environment, to work out his/her own way through the hypertextual structure (macro-narrative). With macro-narrative, hence, the term narrative doesn't refer to a story-telling or story construction activity, but to a mode of presenting the content material which includes some kinds of connection between different elements. Such connections, expressed more or less explicitly by the designer, may suggest, or even impose, to the user some navigation paths, hence turning a hypermedia into a task-oriented environment rather than making it a collection of learning materials in encyclopaedic format.

We will approach the theme of narrative in Section 2. We will start by providing a description of different narrative theories, which will be followed by a presentation of different narrative structures and even identify a *meta-structure*. Afterwards we will approach the concept of narrativity and, finally, we will discuss how narrative can be related to educational applications.

Section 3 provides a brief introduction to learning theories and explains the importance of narrative throughout our development.

Lastly, in Section 4, we will present a case study on how narrative can be used within a specific learning environment, that is, within technology enhanced learning environments.

3.2 Analysing the structure of Narrative

One of the most important questions in narrative is to know how to provide a fulfilling experience. Therefore it is of great importance to define guiding lines for the author of the story. The interdisciplinary field that aims at defining a theory of narrative texts is called narratology.

We will look, in this section, at different narrative theories that have been considered by several authors and in different periods. We will also see how some authors identify structures within narratives, by considering them as a formula, that is, as they schematise narratives by observing a structure for the plot or by identifying patterns in the roles of the characters. Afterwards, we will introduce the concept of narrativity and see the difference between narrative and narrativity. Lastly, we will study different roles that narrative can play in our lives and how they relate to the learning process.

3.2.1 Narrative Theories

In this section we will approach several theories of narratology, since they can help not only to understand the work already done by several narrative theorists but also to differentiate the multitude of concepts and characteristics that are referred in different domain areas, which are central to this thesis (e.g.: psychology, literary studies, cognitive science, etc.).

3.2.1.1 Aristotle

The work of Aristotle has been a major influence for most theorists of this century, who developed their research on the area of narrative analysis. In Poetics, Aristotle suggests that all literary works are imitations of the reality (Berger, 1996) and the purpose of any of such literary works would be to mimic what happens in real life; since life is composed by actions, then all literary works should reproduce such actions.

Aristotle also affirms that tragedy involves an imitation of an action that is *complete* and *unified* and has *magnitude*.

By *completeness* or *wholeness*, he says that a *whole* is what has a beginning, a middle, and an end. With this he means that: the actions of the plot have an ordered structure – if one action follows on another as a necessary consequence; the plot is a self-contained series of events – the first events of the series happen without having a necessary reason; and the last events in the series bring the plot to an exact end – no need for further consequence. The series of events are therefore closed at both ends and inter-connected in between. From this, one can

conclude that any misplacement of an action within the structure of the plot leads to a malformed plot.

The concept of *unity* of the plot is somehow complementary to the previous concept. Aristotle's definition says that any imitation is unified if it imitates a single thing. Since this definition cannot mean that a plot is composed by a single event, one can conclude that this definition does not add anything to the previous definition of completeness (something that is complete and whole is a unity).

With the definition of *magnitude*, Aristotle wants to raise the question of what is the correct magnitude of a plot. The answer to this question is not straightforward, since several factors can be considered to reach a *correct magnitude of a plot*. Nevertheless, the most intuitive measure would be what the audience can remember about the plot, or it may occur in such a way that it does not violates the condition of *completeness*.

His analysis of tragedy identifies it as being constituted by a set of six different components: plot, character, reason, diction (dialogue), music, and spectacle.

He also identified six types of plots: an unqualifiedly good hero fails, a villainous protagonist fails, a noble hero fails through miscalculation, a villainous protagonist succeeds, an unqualifiedly good hero succeeds, and a noble hero miscalculates, but only temporarily, and its final justification is satisfying.

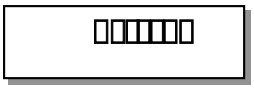
3.2.1.2 Vladimir Propp

The first known attempt to "encrypt" narratives came from Vladimir Propp, who analysed over one hundred Russian folktales and discovered a structure that was shared by all of those stories. In his research, Propp (1971) also identified patterns that could appear in any of those tales, which contemplated all the possible events in folktales.

He came to the conclusion that folktales could be translated into a formula, by decomposing them into a series of functions that represented the actions of the characters. Propp identified 31 *functions* of the *dramatis personae* (the characters involved), and concluded that all of those Russian tales could be

written as a series of *functions*, selected among the 31 functions identified. This definition makes it possible to study a story by means of the *functions* performed by the characters. These *functions* include both the actions of the characters and the consequences of these actions in the story.

Following Propp's theory, any tale begins with a **preparatory phase**, which encompasses the following constituents:



where:

- ***(□) Initial story's situation***: temporal and spatial determination; composition of the family;
- ***(□) Absentation***: hero going away or another form of absence like missing parents;
- ***(□) Interdiction***: form or motivation for interdiction;
- ***(□) Violation***: violation of the interdiction remarks;
- ***(□) Villain makes 1st attempt to get information***: the villain makes an attempt at reconnaissance. Trying to find out more about the victim, or the other way around, i.e., the victim wants to know more about the villain.
- ***(□) Delivery***: the villain receives information about its victim. Or the inverted form of it;
- ***(□) Complicity***: the victim submits to deception and thereby unwittingly helps its enemy**.**

Propp establishes that after the preparatory section, all the analysed Russian folktales have the following **variable story schema**:

(A|a)BC↑DEFG HIK↓Pr-RsL QEx TUW
LMJNK↓Pr-Rs

Each of the letters, in the formula, represents a *function*, where:

- ***villainy (A)***: represents a function where villain causes some harm to a member of the family.
- ***lack (a)***: specifies that a member of the family lacks something or desires something.
- ***mediation (B)*** : occurs when a misfortune made known or the hero is dispatched.
- ***counteraction (C)***: occurs when the hero agrees to a counteraction.
- ***departure (↑)***: represents a function where the hero leaves home.
- ***1st donor function (D)***: in this function, the hero is tested and receives a magical agent or helper.
- ***hero's reaction (E)***: occurs when the hero reacts to agent or donor.
- ***receipt of agent (F)***: this function occurs when the hero acquires the use of magical agent.
- ***spatial change (G)***: represents a function where the hero looks for the object of search.
- ***struggle (H)***: occurs when the hero and the villain join in a direct combat.
- ***branding (J)***: occurs when the hero is branded or signed.
- ***victory (I)***: represents the function where the villain is defeated.
- ***liquidation (K)***: represents the function where the initial misfortune or lack is liquidated.
- ***return ( )***: occurs when the hero returns.
- ***pursuit (Pr)***: occurs when the hero is pursued.
- ***rescue (Rs)***: occurs when the hero is rescued from a pursuit.
- ***unfounded claims (L)***: occurs when the false hero presents unfounded claims.
- ***difficult task (M)***: occurs when a difficult task is proposed to hero.
- ***solution (N)***: occurs when the difficult task is solved.

- ***recognition (R)***: occurs when the (real) hero is recognised.
- ***exposure (Ex)*:** occurs when the false hero or villain is exposed.
- ***transfiguration (T)***: represents the function where the hero is given a new appearance.
- ***punishment (U)***: occurs when the villain is punished.
- ***wedding (W)***: represents the function where hero is married or/and ascends the throne. This function is the culmination of the story and the type of reward received by the hero can be expressed in different forms and not only by a marriage or the ascendance to the throne.

He also grouped those functions, according to their role in the tale, and created a narrative structure of seven items, which we will discuss in Section 2.2.

Other common elements identified by Propp are the roles of the characters and the events taking place. Here is a description of the seven functional roles identified:

- **Hero** – departs to seek something;
- **Villain** – struggles with the hero and tries to stop him from completing his quest;
- **Donor** – donates a magical agent to the hero;
- **Dispatcher** – sends the hero to his quest;
- **False Hero** – falsely pretends and proclaims to be the hero;
- **Helper** – provides help to the hero during his quest;
- **Princess (and Her Father)** – represent the motivation for the quest.

Propp determined spheres of action, which identify the functions performed by a particular type of character, and the further assignment of such types to a particular character. Therefore, in his analysis it is possible to find examples of a particular character that performs in two different spheres of action or different characters performing in the same sphere of action. In other words, a character can perform functions of two different types of characters or it is even possible to have functions of a particular type of character being performed by different

characters. The functions are distributed among the types of characters as we can see in Table

Propp's study is based on folktales, and hence it cannot be directly applied to other genres of literature. However, some authors, such as Arthur Berger (1996), suggest that Propp's functions can be adapted in such a way that every story could be identified within a "Propp Structure".

***Table 1*: Mapping of Propp's Character types into *Functions*.**

Character Type	Functions
VILLAIN	VILLAINY, STRUGGLE, PURSUIT, CHASE
DONOR	1ST DONOR FUNCTION, RECEIPT OF AGENT
HELPER	SPATIAL CHANGE, LIQUIDATION, RESCUE, SOLUTION, TRANSFIGURATION
PRINCESS (AND FATHER)	DIFFICULT TASK, BRANDING, EXPOSURE, PUNISHMENT, WEDDING
DISPATCHER	ABSENTATION
HERO	COUNTERACTION, HERO'S REACTION, WEDDING
FALSE HERO	COUNTERACTION, HERO'S REACTION, UNFOUNDED CLAIMS

One of the major advantages presented by this theory is the level of detail that the morphological analysis provides. Nevertheless, due to the specificity of the context in which it is based, an adaptation is needed to make it more modern and to respond to today's needs and cultural influences.

3.2.1.3 Mieke Bal

Bal's *Narratology: Introduction to the Theory of Narrative* (1985) is widely considered to be one of the most important contemporary studies of narrative.

In order to understand to what extent Bal's work appears to be so important, let us first give an overview of the concepts and definitions identified by her: *a narrative* is a text in which an agent tells a narrative; a *story* is a *fabula* that is presented in a certain manner; a *fabula* is a series of logically and chronologically related events that are caused or experienced by actors; an event is the transition from one state to another; *actors* are agents that perform actions – they are not necessarily human; *acting* is defined as causing or experiencing an event.

The distinction between a *story* and *fabula* is based upon the difference between the sequence of events and the way in which the events are presented.

The above definitions suggest a 3-layer distinction – *text*, *story*, and *fabula*. The *fabula* can be understood as the material that is worked into a story and has been defined as a series of events. This series is constructed according to certain rules, usually called the *logic of events* - which may be defined as a course of events that is experienced by the reader as natural and in accordance with the world. Events, actors, time, and location together constitute the material of a *fabula* – also called the *elements*.

The organisation process of achieving a *story* from a *fabula* can be summarised as follows:

- the *events* are arranged in a sequence which can differ from a chronological sequence;
- the amount of time which is allotted in the *story* to the various elements of the *fabula* is determined with respect to the amount of time which these elements take up in the *fabula*;
- the *actors* are provided with the distinct traits. In this way, they are individualised and transformed into characters;
- the locations where the events occur are also given distinct characteristics and are thus transformed into specific places;
- in addition to the necessary relationships among actors, events, locations and time, all of which were already describable in the layer of the *fabula*, other relationships exist among the various elements;
- a choice is made from among the different points of view from which the elements can be presented.

3.2.1.4 Edward Branigan

Branigan (1992) defined the notion of schema as an arrangement of knowledge already attained by a perceiver that is used to predict and classify

new sensory data. Having this concept as a starting point, he generalised it and defined the meaning of narrative schema that included 7 elements (see Table 2).

Table 2: **Branigan's Structure**.

Introduction of Settings and Characters
Explanation of a State of Affairs
Initiating Event
Emotional Response or Statement of a Goal by the Protagonist
Complicating Emotions
Outcome
Reactions to Outcome

These 7 elements were successively analysed by other authors. Brooks (1999), for example, pointed out that the first two elements introduce the narrative, physical attributes, the environment status, as well as the state of story world and the important characters. The initiating event is the focus, which sets the affairs of the story world even more off balance than they may have already been. In element four, the main character makes a direct statement, which focuses the narrative around his main goal. Elements five and six are part of a causal relationship that comes from the initiating event. Element seven is then part of a causal relationship with element six. Following Branigan's terminology, this causal relationship is defined as focused causal chains, which are important for helping the audience/reader to understand life as represented in a narrative. Branigan's definition of narrative schema follows in part the work of Propp, and refines it in order to contemplate the social, psychological, and emotional aspects of the story and their characters. This attribution of personal and social values is something that is lacking in Propp's morphology and is indispensable if we want to achieve a modern narrative and with the aim to provide a good understanding of life represented in a narrative form.

3.2.1.5 Joseph Campbell and Christopher Vogler

Campbell (1993), a mythologist, analysed narrative as a "hero's journey", where he determined several stages. Vogler's work (1999) was based on Campbell's and provides a guiding tool to writers.

Their work concerns mainly the identification of a structure (which we will approach in Section 2.2), which can be adapted to narratives of different cultures and help increasing the impact of the story itself in the reader.

The application of their work can be understood by Vogler's statement that "*All stories consist of a few common structural elements found universally in myths, fairy tales, dreams, and movies*" (Vogler, 1999).

Besides identifying a structure to narrative, these two authors have also identified a group of seven archetypes that appear in the journey of a hero. However, it is in Vogler's book, (Vogler, 1999), that we can find an explicit description of them:

- **Hero** – departs on a journey after being challenged and sacrifices himself for his world;
- **Mentor** – trains and motivates the hero to overcome his challenge;
- **Threshold guardian** – gives the hero access to a special part of the world if he is able to overcome a certain obstacle;
- **Herald** – announces a change or a challenge which demands a decision;
- **Shapeshifter** – introduces uncertainty because his personality is misleading and it is difficult to understand whether he represents an enemy or not;
- **Shadow** – is determined to destroy the hero as he regards him as his enemy, so he usually represents the villain;
- **Trickster** – introduces change and chaos, usually through the use of comedy.

These roles, as well as the ones described by Propp are not constrained to the same personality in each story. Each of them acts as a guideline that can be followed by varied characters.

3.2.2 Schematising Narratives

One of the most important questions in using narrative is to know how to provide with it a fulfilling experience. Part of it comes from the aesthetic of the narrative itself. Therefore it is of great importance to define guiding lines for the author of the story.

One way of looking at a narrative is by considering it as a formula, that is, to see it as a sequence of events that is common to most narratives. Schematising is a tool not only for authorship but also for computational purposes, as a good way of manipulating a story (or any type of information) is to organise it into a structure.

Note that not every story should necessarily follow a structural pattern. It is obvious that we could look at a structure and purposely write a story which does not follow it. The main interest is to study good or successful stories.[7]

When the authors, mentioned in this section, schematised narratives they observed a structure for the plot, but they also identified patterns in the roles of the characters. By analyzing the structure of the plot and the existence of functional roles in the narrative, these authors allow multiple ways to approach narrative and work with it.

We will look at three different groups of structures and compare them, creating a meta-structure. In all of the structures that we will see, the story develops itself around a problem and a hero. Another aspect that they all have in common is that they accept the existence of multiple plots, and we can even identify in some of the structures that they implicitly include different problems and confrontations.

3.2.2.1 Three groups of structures

[7] Such a classification as being a good story is naturally a subjective one therefore we must consider successful stories as good stories. We should not be restricted to the ones we enjoy. We will consider successful or popular stories those that have made a positive impact in many people.

In group ***A*** we will consider the structures identified by Edward Branigan and Kevin Brooks (see Table 3). The latter provides a structure, which is based on Branigan's and differs very little from that one, however, we will study both of them, since they have different purposes. Brooks' structure is aimed at expressing multiple points of view and Branigan's at expressing cinematographic narrative.

***Table 3*: Structures of Group *A*.**

Branigan's Structure	Brooks' Structure
A.1.1 Introduction of Settings and Characters	A2.1 Speaker Introduction
A.1.2 Explanation of a State of Affairs	A2.2 Character Introduction
A.1.3 Initiating Event	A2.3 Conflict
A.1.4 Emotional Response or Statement of a Goal by the Protagonist	A2.4 Negotiation
A.1.5 Complicating Emotions	A2.5 Resolution
A.1.6 Outcome	A2.6 Diversion
A.1.7 Reactions to Outcome	A2.7 Ending

Group ***B*** of structures includes the work developed by Propp. He discovered a structure of seven items (see Table 4) by grouping the 31 functions of the *dramatis personae*, according to their role in the tale.

His structure includes explicitly two moves, that is, it contemplates two conflicts within one story by repeating some events. It is possible to include just one move or even more than two, by adapting easily the structure.

***Table 4*: Structures of Group *B*.**

B.1 The Initial Situation
B.2 The Preparatory Section
B.3 The Complication
B.4 Donors
B.5 From the Entry of the Helper to the End of the First Move
B.6 Beginning of the Second Move[8]
B.7 Continuation of the Second Move

Group ***C*** includes the structures identified by Campbell (see Table5) and Vogler (see Table 6), which are considered "universal structures" as they have been identified in different narrative genres. Vogler described twelve items of a "hero's journey" as an adaptation of Campbell's structure (which included seventeen items). Both of these structures have been successfully applied to many Hollywood films.

***Table 5*: Structures of Group *C*: Campbell.**

Departure	Initiation	Return
C.1.1 The Call to Adventure	C.1.6 The Road of Trials	C.1.12 Refusal of the Return
C.1.2 Refusal of the Call	C.1.7 The Meeting with the Goddess	C.1.13 The Magic Flight
C.1.3 Supernatural Aid	C.1.8 Temptation Away from the True Path	C.1.14 Rescue from Without
C.1.4 Crossing the First Threshold	C.1.9 Atonement with the Father	C.1.15 Crossing the Return Threshold
C.1.5 The Belly of the Whale	C.1.10 Apotheosis	C.1.16 Master of the Two Worlds
	C.1.11 The Ultimate Boon	C.1.17 Freedom to Live

***Table 6*: Structures of Group *C*: Vogler.**

[8] This item represents a repetition of "The Preparatory Section", "The Complication" and "Donors" as well as of some events from "The initial situation" and "From the Entry of the Helper to the End of the First Move". Therefore, it would be redundant to explain any of the events of those steps.

Act One	Act Two	Act Three
C.2.1 Ordinary World	C.2.7 Approach to the Inmost Cave	C.2.10 The Road Back
C.2.2 Call to Adventure	C.2.8 Ordeal	C.2.11 Resurrection
C.2.3 Refusal of the Call	C.2.9 Reward	C.2.12 Return with the Elixir
C.2.4 Meeting with the Mentor		
C.2.5 Crossing the First Threshold		
C.2.6 Tests, Allies, Enemies		

3.2.2.2 Identifying a Meta-Structure

As we have already seen above, all of these structures are centred around the existence of a problem and a hero. Therefore, almost every step of our meta-structure concerns either the hero, the problem, or his "relation" with the problem.

We can see the existence of an overlap in some steps, whether because different steps appear in the same items, or because different items appear in more than one step. However, the purpose of identifying a meta-structure is to help understand what the structures have in common.

This meta-structure does not impose any order on the events, as, for instance, Brooks' schema is not a fixed structure in terms of order. He defends that we can, and must, rearrange its elements according to the desired genre.

Step 1 - Introduction and Presentation

An introduction is the basic step to every narrative. This is a fact that we acquire since we learn to write. We are familiar with writing introductions and therefore we already know that this is where we introduce the characters and the world where the story takes place.

In group ***A***, Branigan introduces the settings and the characters in A1.1. In this step the story aims at inducing empathy towards the characters. In Brooks' schema (items A2.1 and A2.1) the characters' introduction and the description of the world are given by the characters and thus dependent from their own points of view. Since his schema is directed to the use of first-person story, allowing

different points of view, “certain facts would be mentioned or emphasized while others would be omitted as the character describes their world” (Brooks, 1999).

Propp's structure begins with the explanation of the initial situation (item B.1), that is, of the universe where the story takes place, for example a Kingdom, and of the characters.

The story starts by introducing the family members, their social situation and their way of living. We also have the description of previous events that left their marks on the family, such as prayer for the birth of a son, miraculous/supernatural forms of birth (eg. from animals) and prophecies or forewarnings. Our hero and false hero to be are also described (both physically and psychologically) in this part.

In group ***C***, especially in Vogler's structure (item C2.1), we begin the story, like in the other groups, with the description of the world. The description concerns the characteristics as well as the goals of the hero. We create empathy with the characters. The limitations of the hero are also revealed.

Step 2 - Awareness of problems

There is an unbalance of the world and a conflict appears (items A1.2, A1.3 and A2.3).

Propp identifies in B.2 the prohibitions and violations. In the *Complication* (B.3) the villain acts, which introduces the problem to be solved. The hero appears or is identified among the other characters. All of these events and descriptions appear in B.6, although concerning a second move.

The hero is challenged with a quest or a problem (C1.1 or C2.2). In Campbell's structure (C1.3) the hero is tempted to “the other side”, to the obscured part of the “special world”, which caused the problem.

Step 3 - Reaction/ Response of the hero towards a problem

Branigan identifies an emotional response (A1.4, A1.5) of the hero and his establishment of a goal. The problem affects and directly influences the hero at an emotional level.

The hero's reaction can either be positive or negative. Deception, contempt and feeling victorious are also feelings that appear in B.4 (and B.6).

The hero feels hesitation and fear (C1.2, or C2.3, and C1.12), however he agrees to face the challenge (C1.4 or C2.5) and enters a "special world". This step includes his preparation to fight failure, defeat and death (C1.6 and C2.7). It introduces reconciliation between the hero and a paternal figure (C1.9) and the hero is elevated to a superior being (c1.10).

Step 4 - Helpers

An important part in a story is represented by the help that the hero receives. Although there are no helpers in the structures of group ***A***, it is very uncommon, if not impossible, to find a narrative where the hero can face and even solve the problem without no sort of help. To create a believable story it is necessary to include objects (or items) or people that aid the hero. Even in superhero stories, helping figures exist.

In the item of *Donors* (B.4 and B.6) we can find the description of someone who donates a magical item and his encounter with the hero or even a task that he fulfils in order to receive the helping item and it is only in *From the Entry of the Helper to the End of the First Move* (B.5 and B.6) that the helping agent appears. Therefore, we can see the importance that is given to the seek and preparation of the hero to receive the magical help.

A situation or people help the hero to get to know the "special world" (C1.3). His mentor (C2.4), his allies (C2.6) and a "goddess" (C1.7) are some of the helping figures. The hero himself is rescued or saved by others (C1.14 and C1.13).

Step 5 - Confrontation

Our hero must be confronted with the problem. In Brooks' structure he tries to negotiate (A2.4), avoiding its resolution. He attempts to compromise instead of fighting the problem. When negotiating, he does not solve the problem, he gives something up, and his problem weakens.

The hero is confronted with the villain and struggles with him (B.5 and B.7).

The hero is confronted with his greatest fears and risks/endangers his life (C2.8). He finds himself trapped (C1.5) and is faced with a challenge of survival that he confronts in order to continue his journey. In the climax of his adventure

he meets the challenge he committed to overcome (C1.11). Later, the hero returns to the "special world" to surpass a final obstacle (C1.15).

Step 6 - Consequences of confrontation

There is an outcome (A1.6 and A2.5) to the conflict due to a resolution. The problem itself affects the characters. In Brooks' schema there is a resolution for every conflict that may appear.

The hero, after fighting the villain (in the previous step), faces a difficult task and resolves it, which ends the initial problem. The false hero is revealed and punished. The victory is attributed to the true hero, who is recognised for his brave actions. All of this happens in items B.5 and B.7.

The hero is reborn after confronting death and learns from the experience (C2.9). He is later forced to leave the "special world" but commits to finishing his task (C2.10). He achieves victory and obtains something vital to the well being of his world (C1.11).

Step 7 - Return and conclusion

Group ***A*** presents the reactions to the outcome (A1.7) and Brooks also introduces *Diversion* (A2.6) in his structure as a way of "demanding" elements of believability that contemplate secondary and decorative events and that have nothing to do with the problem itself.

The *Ending* (A2.7) is the outcome of the narrative itself although for Brooks it may appear in the beginning of the story. For example, in any story about the Titanic we already know the end of the story, the ship will sink, so we can begin the story by revealing this fact, without the reader feeling deceived.

Propp's *Continuation of the second move* (B.7) includes actions as the recognition of the hero, exposure of the false hero, transfiguration, punishment of the false hero or the villain and (as a diversion) the wedding or the accession to the throne.

In group ***C***, we see the purification and transformation of the hero while he returns to his world (C2.11). He shares with all the obtained "object" that will be beneficial for his world (C2.12). He becomes the *master of the two worlds*

(C1.16), since he was victorious over them both, and the first world regains peace (C1.17).

3.2.3 Narrative and narrativity

Narratology is not always involved only in understanding the structure of narrative, but in fact some narratologists have concentrated on analysing its affordances. A relevant example is represented by Bal (1985), who analysing the effect of being given a narrative, points out the need of a theory not only of narrative but also of narrativity. This name refers not to an object having an existence of its own (a narrative in a book or software tool exists independently of the fact that somebody is using it), but expresses the relation between a narrative and a user. In other words, this is the relation between an external object (i.e., a given narrative) and the internal representation that this narrative is able to raise in the user's mind. Narrativity, hence, can not be described simply in terms of characterizing features, as is the case with narrative, but depends also on how the user perceives the narrative elements.

The concept of narrativity is not related only to "texts in natural language". Pictures, which could not be considered narratives in the literal meaning of this term, do have a narrativity as well, which depends on their power to evoke a narrative in the user's mind.

As highlighted by Porter Abbott (2002), some pictures may produce an effect called "narrative perception" that is, a natural tendency to associate a narrative time to static scenes. This author argues that with some kind of representations, which describe an action in progress, we try to grasp the story pictured, not only in space but in time as well. For instance, Figure1, representing a story of the Bible, clearly depicts a single event (a writing magically appearing on a wall), but the attitude of the characters suggests at least a previous event (people happily dining) and raises questions on what would take place next. Analogously, Figure 2 shows a single scene (a young violin player resisting to a lover's hug) but also suggests a likely previous scene and raises questions on next events. In both cases, though viewing a static scene, the user has actually the impression to see a story (that is, as a short movie) and is lead to work out a personal view of the story represented, figuring out causal

connections between the actors' actions and the event(s) taking place. This inferential activity is analogous to what we do when we are exposed to a textual narrative and possibly enrich it in our mind while constructing a coherent mental representation of the narrated events.

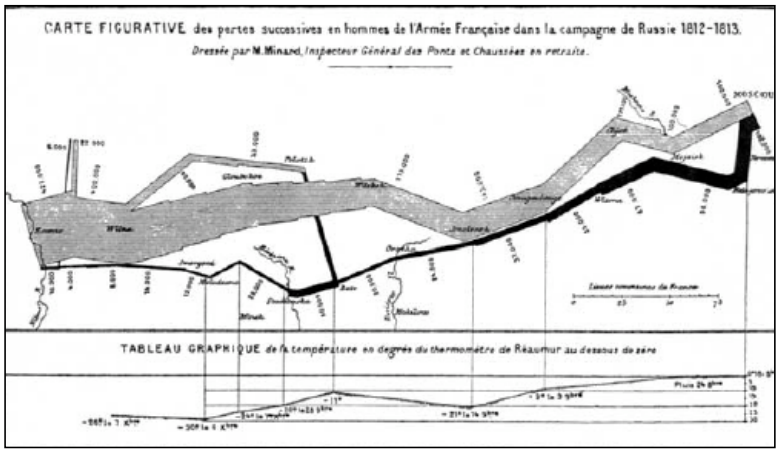
While dealing with textual narratives we are likely to make inferences on descriptive features, while the temporal sequentiality is given. With pictures, on the other hand, descriptive features are given and the temporal sequence needs to be inferred. In both cases however, understanding the narration implies inferring some missing elements. It is the presence of narrativity which allows us to build a narrative in our mind based on the given elements.

***Figure 1*: An example of picture with a high level of narrativity (from (Abbott, 2002, p. 7).**

***Figure 2*: Another example of picture with a high level of narrativity (from (Abbott, 2002, p. 8).**

Not only pictures but also data representations can contain some narrativity. Figure 3 shows a chart, considered a classic of data graphing, describing Napoleon's 1812 campaign in Russia. Making use of labels and of lines of different thickness and colours, this graph manages to express at the same time the army size, location in both advance and retreat, direction, temperature and dates. In other words, it tells a whole story in compact but meaningful way. Arcavi (2003) calls this kind of representation *Narrative Graphics*. He points out that this kind of pictures allows a better understanding of the data presented since it includes also cause-effect relationships, and a cluster of information

***Figure 3*: An example of Narrative graphics (from (Arcavi, 2003)).**



It is clear from the above considerations that further exploring the potential of the narrativity could shed some light on how narrativity could influence understanding and knowledge construction, and hence result highly beneficial in education. Unfortunately the literature currently does not offer much material on this aspect.

3.2.4 The nature of narrative in relation with educational applications

The theoretical frameworks presented above have influenced in various ways the currently available applications of narrative in education. If we leave aside narratology and limit ourselves to the educational literature, the term "narrative" is used in a rather intuitive way and with several different shades. A basic definition, which captures the essential point of what is narrative, is due to Bruner (1990), who claims: "(narrative is) a unique sequence of events, mental states, happenings involving human beings as characters or actors. These are its constituents. But these constituents do not, as it were, have a life or meaning of their own. Their meaning is given by their place in the overall configuration of the sequence as a whole - its plot or *fabula*.".

In the field of education, however, it is possible to find several partial, more specific ways of defining narrative, which depend on what is the starting point for analyzing the learning process.

If this starting point is the content knowledge to be acquired, narrative can be viewed as a form of *external representation*; for instance:

- Turner and Turner (2003): narrative is a representation of a series of events meaningfully connected in a temporal and causal way. A "text" may be in any medium, thus encompassing the spoken word, film and pictures as well as written material.
- Porter Abbott (2002): "narrative is the representation of an event or a series of events. Without an event or an action you may have a description, an exposition, an argument, a lyric".
- Lieblich et al. (1998):"discourse, or an example of it, designed to represent a connected succession of happenings".

If the focus is to analyse as students build internal representations by working out given external ones, narrative can be seen as a set of cognitive processes; for instance:

- Luckin et al (2001): "narrative is a process of both discerning and imposing structured meanings which can be shared and articulated. The result of this process is also often referred to as a narrative i.e. the product of discerning and imposing structured meanings which can be shared and articulated".
- Scalise Sugiyama (2001) "narrative is a highly complex psychological process, depending for its operation upon the integration of numerous cognitive mechanism (e.g. cause-and-effect reasoning, theory of mind, language, spatial reasoning)".

Focusing on student's knowledge acquisition and elaboration of internal representation schemes, narrative can be viewed as an organizational principle; for instance:

- Polkinghorne (1988): "the term "narrative" is used as the kind of organizational scheme expressed in story form. Narrative can refer to the process of making a story, to the cognitive scheme of the story, or to the result of the process - also called stories, tales,

histories. Here it is used narrative and its cognates to refer to both the process and the results".

- Pléh (2003): "narration is a basic non-associative organizing principle of the human mind"
- McEvan (1997): "narrative thinking - storying – is a successful method of organizing perception, thought, memory and action"
- Kvernbekk (2003): "narratives are variously described as a method, as the result o a method, as a way of making sense of life, as a phenomenon"

If the focus is on learning as a social activity aiming to transmit a culture's values, narrative can be seen as a *social expression*; for instance,

- Szilas (1999): "by narrative we mean a certain type of artistic and social expression, where a kind of imitation of real events is involved".

The different amount of citations given for each of the above views highlights that some of them are more diffused than others. We want to point out, moreover, that these different views of narrative are not really in contradiction with each other nor mutually exclusive. For instance, considering narrative as a form of representation does not exclude that it could work at the same time as organizing method.

3.3 Learning Theories

In this section we will present a brief survey of the changing streams that occurred within the learning theories research domain.

Different learning theories, from behaviourism to cognitivism and then to constructivism, adopt distinct perspectives about the learning process. In Kuhn's terminology, they may be considered different paradigms. Behavioural learning theories (classical conditioning – Pavlov, Watson - and operant conditioning – Skinner) were developed in the first decades of the last century while the paradigm shift from behavioural to cognitive theories started to occur in the in the 1950s. Behaviourism remains quite influential nowadays, but recent theories have gained more followers.

Behaviourism explains learning in terms of external stimuli without recurring to mental models. In fact, it was the rejection of Wundt`s method of introspection that lead the early learning theorists to focus on and limit themselves to the study of observable behaviour. Learning theories in behaviourism, more specifically in psychological behaviourism9, purport to explain human and animal behaviour in terms of external physical stimuli, responses, and reinforcements (Stanford Encyclopedia of Philosophy). Behaviourism defines learning as a change of behaviour due to external stimuli. As Cooper (1993) points out, this conception of learning places emphasis on an "objective" research approach as well as on the importance of the environment for learning processes.

The paradigm shift from behavioural to cognitive learning theories was instigated by three developments:

- The advent of computers (the first computer was built by Konrad Zuse in Berlin 1941; more elaborated models were soon constructed by IBM in the U.S.),
- Information processing theories (Shannon and Weaver published their work "*The mathematical theory of communication*", 1949),
- Cybernetics and feedback models (Winer, 1949).

Cognitivism did not confine itself to the study of observable behaviour. Rather, it decided to go inside the learners' mind. From a cognitivist perspective, learning consists of the acquisition of knowledge and skills. Knowledge is considered to be a mental representation in the mind of the learner. Information processing is seen as playing a vital role in converting information into knowledge. It is assumed that information that is gathered in the outside world through sensory receptors is processed in sensory and short-term memory where it is turned into knowledge that is then stored in long-term memory.

In constructivism, the establishment of a mental representation of the outside world is viewed as a constructive act of the individual. The constructivists go a step further than the cognitivists and define knowledge as an

[9] There are several divisions within the behaviourism theory: methodological behaviourism, psychological behaviourism and analytical behaviourism.

entity constructed by each learner through a continuous learning process. Constructivist theories[10] assume that learners construct their own knowledge based on the interaction with their environment as they attempt to make sense of their experiences. Learners therefore are not empty vessels waiting to be filled but rather active organisms seeking meaning (Driscoll, 1994).

Comparing behaviourism and constructivism, Cooper concludes: "The constructivist sees reality as determined by the experiences of the knower. The move from behaviourism through cognitivism to constructivism represents shifts in emphasis away from an external view to an internal view. To the behaviourist, the internal processing is of no interest; to the cognitivist, the internal processing is only of importance to the extent to which it explains how external reality is understood. In contrast, the constructivist views the mind as a builder of symbols-the tools used to represent the knower's reality. External phenomena are meaningless except as the mind perceives them. Constructivists view reality as personally constructed, and state that personal experiences determine reality, not the other way round" (Cooper, 1993, p. 16).

From this comparison, we conclude that our further investigation should concentrate on constructivist theories. We prefer these theories because they model the learner as a person with a wide set of opportunities to explore the world and new situations which enables him - through this active process – to acquire and develop knowledge.

We have selected L. Vygotsky, J. Piaget and J. Bruner as representatives of the constructivist paradigm. This section presents a summary of the research conducted by each of these psychologists. Since all of them studied not only how people construct "their worlds", but also how this capacity for mental construction develops within children, the account of these works may also help us understand the meaning and influence of dramatic games along children's development stages.

3.3.1 Lev Vygotsky

[10] It should be stated that constructivism theory is much deeper and wider than the analysis here presented. Nevertheless, for the purpose of this survey this brief analysis gives us sufficient support and understanding.

Vygotsky (1978) is considered the main person responsible for the social development theory of learning. He suggests that social interaction has a major influence on cognitive development. Vygotsky provides an example that supports the constructivist learning theory. He suggests that pointing a finger initially is only a meaningless gesture. However, as people react to this action, it becomes a movement, which has a meaning.

The application of Vygotsky's theory to education and learning strategies implies that teachers and children have new roles in the learning process as they collaborate with each other. Instead of a teacher reciting facts and knowledge, she/he must engage students' interest, simplify the knowledge acquisition process, and motivate students to pursue their learning goals. Constructivism also advocates that the acquisition of knowledge is an active process of building understanding rather than passive reception of information. Four assumptions are the basis of constructivist learning:

- knowledge is physically constructed by learners who are involved in an active learning process;
- knowledge is symbolically constructed by learners who are making their own representation of action;
- knowledge is socially constructed by learners who convey their meaning-making to others, and;
- knowledge is theoretically constructed by learners who try to explain things they do not understand.

Vygotsky believes that cognitive development is highly dependent and shaped by social interactions and that social learning would definitely lead to cognitive development. Social learning theory is usually associated with A. Bandura, who argues that each child's individual development is at the centre of instruction.

Each child is able to construct their knowledge in many ways and using different media: reading, listening, exploring, and experiencing the environment that surrounds them. Bandura's learning theory emphasises the importance of observing and modelling the behaviours, attitudes and actions of others. From observing others it is possible to learn how to do it yourself, (Bandura, 1977).

3.3.2 Jean Piaget

Piaget (1951) argues that the knowledge acquisition process is a progressive construction of logical structures, starting from a small piece of information and continuing with the acquisition throughout life by enriching such piece of information with more complex structures.

Piaget refers to this as constructivism, since he believed that the acquisition of knowledge is a process of continuous self-construction. Further, he does not underestimate the value of the impact of the environmental and cultural aspects during this process. Piaget proposes a theory of childhood cognitive development, which divides such development into four distinct periods:

- **Sensorimotor Period** (birth - 2 years): during this period, infants acquire their information about the world by exploring it with their vision, grasping movements, and audition.
- **Preoperational Thought** (2 - 6/7 years): in this period, children acquire representational skills, especially through language. Each child is very egocentric and self-centred, and therefore their representation skills are based only on their own perspective of the world.
- **Concrete Operations** (6/7 - 11/12 years): differently from the previous phase, children in concrete operation stage are able to take account of another person's perspective, and incorporate such perspective in their own point of view.
- **Formal Operations** (11/12 years to adult): at this phase, it is common that a person can solve abstract problems.

Nevertheless, there are many psychologists defending that the evolution of children's cognitive development happens in such discrete phases, and they add that the differences among each period are sometimes unobserved due to the influences imposed by environmental, and, cultural factors.

3.3.3 Jerome Bruner

Bruner in his book Acts of Meaning (1990) tries to achieve a definition for the concept of folk psychology, at the same time he tries to prove that it is culture that shapes human life and the human mind that gives meaning to action by situating its underlying intentional states in an interpretative system.

This is realised in his following sentence: "(...) We have an innate and primitive predisposition to narrative organisation that allows us quickly and easily to comprehend and use it, the culture soon equips us with the traditions of telling and interpreting in which soon come to participate" (Bruner, 1990, p. 80).

From this, he reaches several definitions that embrace the meaning of folk psychology, which is crucial and innate in the human nature:

- Folk psychology is a system by which people organise their experience in, knowledge about, and transactions with the social world;
- Folk psychology is about human agents doing things based on their beliefs and desires, striving for goals, meeting obstacles that they best or which best them, all of this extended over time.

From this, he goes a step further and concludes that folk psychology is mostly organised in the form of narrative, rather than in a logical or categorical format: "(…) a narrative is a unique sequence of events, mental states, happenings involving human beings as characters or actors. These are its constituents. But these constituents do not, as it were, have a life or meaning of their own. Their meaning is given by their place in the overall configuration of the sequence as whole - its plot or fabula" (Bruner, 1990, p. 43).

Therefore, besides having a natural predisposition to arrange our experience accordingly to cultural laws and influences, we do that by organising every important event in a narrative form, and the meaning associated with each event comes from its positioning within such a structure.

This narrative of life requires four important elements for being successfully carried out:

- an emphasis on human action - the protagonist of the narrative;
- a sequential order should be established and maintained - if this is violated the events lose their meaning and purpose;

- sensitivity to realise its canonical structure - each person should recognise what is canonical and what it is not in human interaction;
- each narrative should have the narrator's perspective.

Moreover, the use of narrative in folk psychology as a form of organisation experience holds two important aspects: framing and affect regulation. The framing aspect provides the means to construct/reconstruct the world, of characterising its flow, of dividing the events. If someone lacks the faculty of doing such framing, she/he can be lost inside a hectic experience. The affect regulation aspect provides each person with a way of choosing which bits of experience should be schematised (or even stored) in memory. The most memorable events are the ones that have a high emotional load, i.e., implying something exciting, something unpleasant, etc.

Bruner summarises his opinion about the importance of narrative in human life by saying that: "(…) our capacity to render experience in terms of narrative is not just a child's play, but an instrument for making meaning that dominates much of life in culture - from soliloquies at bedtime to the weighing of testimony in our legal system" (Bruner, 1990, p. 97).

3.3.4 Analysis of the Learning Theories

The introduction and integration of the technology in schools have created new opportunities for social interaction. The social context has been extended in terms of spatial localisation and in terms of the sense of community. Within the computerised world it is possible to engage in a social learning process - which is advocated by Bandura - with someone that is in the other side of the world, and the concept of peers is not only confined to the ones within their classroom, but anyone that collaborates with them through the computerised medium - world wide. Children should be able to make use of these facilities and use them to consolidate their learning process. Nevertheless, some special attention should be paid to the mediation of such a learning process.

Further, constructivism theory offers a better approach to the development of computer applications since it privilege the acquisition of knowledge through the experience of new situations by the learner. In addition, within a computerised world the learner can engage in different situations that allow them

to test concepts in a safe environment, i.e., it can approach the knowledge acquisition through a trial and error strategy.

Piaget also defends that make-believe activities allow children to perform different roles, and gain control of the course of the action, and to acquire the skills to organise the sequence of a play and most important to project these experiences onto the cognitive and social requirements of the real world. Make believe and pretend plays are especially important during the preoperational thought stage, since they can help the children to start to understand and take account of the others point of view of others.

Finally, Bruner emphasises the presence of narrative in human life (not just in childhood) and human mind, and identifies which elements are required for a successful use of narrative as a vehicle of organising experience.

3.4 Using Narrative in Technology Enhanced Learning Environments

The use of Narrative in TELEs can be found in the literature connected to two different situations:

- The student is required to generate a narrative
- The student is given a narrative to work with

Letting a student create a narrative may have different purposes (e.g., organizing information, sharing knowledge) or support the development of cognitive abilities (e.g. making inferences). The construction of a narrative has been successfully used in education to support the cognitive development and knowledge acquisition of children. Narrative, as a matter of fact, is recognized as a privileged form of thinking, which is present in children from the age of 2 and a half/3 years, independently of the culture where they live (Scalise Sugiyama, 2001).

From the cognitive point of view, Kintsch (1998) evidenced that narrative is a form of linear mental representation which follows as for abstraction, procedural and episodic representations. Information processing at this level appears to be analytical and rule-governed. Karmiloff-Smith (1992, cited by Kintsch 1998) highlights the importance of narrative representations since they

allow human beings to re-describe, with higher cognitive complexity, experiences that they have previously encoded with representations of lower cognitive level (such as procedural or episodic memories). Representational re-description is gradually automated with the increase of age from childhood to adulthood, up to perform it without effort and often even not awarely.

Going further in recognizing the role of narrative representations in human cognitive evolution, Donald (1991) points out that this ability characterizes an important stage of human development not only from the ontogenetical point of view, but also from the phylogenetical one. In this respect, Donald defines as *theoretical culture* (that is, widely making use of abstraction) the phase of cultural development in which we live. The immediately preceding developmental phase, from which the current one is derived, was characterized by a more limited level of abstraction and by the use of narrative as the only communication form.

On the other hand, giving students a narrative to work with can take place in different situations, that is, the narrative is embedded in a TELE (e.g., to connect representations in multimedia environments) or it is generated automatically within the TELE (e.g. to give believability to intelligent agents). Giving students a narrative may have different purposes. The simplest example is story-telling in learning environments for small children; in this case the purpose is to give children a model to learn construct the story with the educational implications pointed out above.

More often, the didactical purpose is related to memorization, understanding and problem solving processes. Some studies highlight as narrative can provide a macro-structure to organize the various resources offered within learning environments such as educational CD-ROMs. In this respect, Laurillard et al (2000) carried out some experimental studies by means of commercial educational CD-ROM, which show how a richness of resources can give rise to a side-tracking effect, making the students focus on the operational aspects of the task at hand rather than on the content knowledge to be acquired. It emerges from this study that narrative can be used to guide the construction of knowledge in such environments; to this end, it seems important to analyse the role of narrative as a macro-structure from two different points of view: 1) that of the learners, by describing how they can gain a holistic understanding of a given

task or learning activity; 2) that of the teachers, by describing how they can present tasks so as to support learners in building such overview of the considered topic.

A further study by Luckin et al (2001) investigated the nature of interactions between learners and the type of CD-ROM typically used at school. Their research aim was to evaluate the effectiveness of multimedia interactive learning environments which provide global coherence by means of a macro-narrative, local coherence by means of a micro-narrative, and a network of links between the two levels. For this sake, they built three different CD-ROMs with the same content knowledge on Darwin's theory of evolution (based on visit to the Galapagos islands), but with a different narrative structure. All three versions included: sections of content material, with individual micro-narrative; some guidance features (menu, guide, and search system facility), some answer construction tools. This study showed that the different narrative structures used gave rise to different approaches to the task at hand. Moreover, it showed that the results were influenced not only by the narrative used, but also by the relationship between the given narrative guidance and the system features supporting the answer construction process. The authors call such relationship *narrative control*.

3.5 Conclusions of Section 2

Narrative is a natural and understandable resource that teachers value to aid the learning process. It has been used, for instance, as an important methodology by teachers of foreign languages at school. This successful use of narrative is what encourages several researchers to include narrative as a support to learning environments and motivated the production of this survey.

In this survey we have discussed several theories concerning narrative and we have approached narrative from different points of view within narratology. Narrative is present in our lives through different contexts and by playing different roles in it. Stories have such an importance in our development due to the many functions they have in society (such as social interactions) or in

individuals (such as knowledge acquisition). It is through the study of learning theories that we have presented that importance.

Learning theories of several authors explain the importance of narrative in learning processes and identify the fundamental role of narratives not only in childhood but also in adulthood. We have seen how theories of behaviourism, cognitivism and constructivism perceive our development, and discussed the views of constructivist authors. Constructivists defend that knowledge is obtained through our interaction with the environment and by the attempt to understand our experiences.

Furthermore, since several researchers have already applied narrative and narrative techniques to the creation of effective learning environments, we introduced, in this chapter, the use of narrative in technology enhanced learning environments. Therefore, we analysed the two functions that narrative can have in TELEs, that is, as a task or as tool for the student.

In conclusion, narrative can be used as a meaningful tool in learning environments due to its role in learning processes. The use of narrative in learning environments represents a growing field of research that aims at providing natural and successful processes of learning.

3.6 References

Abbott, H. P. (2002). *The Cambridge introduction to narrative*. Cambridge University Press.

Arcavi, A. (2003). The role of visual representations in the learning of mathematics. *Educational Studies in Mathematics*, *52* (3).

Bal, M. (1985). *Narratology: Introduction to the theory of narrative*. University of Toronto Press Inc.

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Berger, A. A. (1996). *Narratives in popular culture, media and everyday life*. Sage Publications (USA).

Branigan, E. (1992). *Narrative comprehension and film*. Routledge.

Brooks, K. (1999). *Metalinear cinematic narrative: Theory, process, and tool*. Unpublished doctoral dissertation, Massachusetts Institute of Technology.

Bruner, J. (1990). *Acts of meaning*. Harvard University Press.

Cooper, P. A. (1993). Paradigm shifts in designed instruction: From behaviourism to cognitivism to constructivism. *Educational Technology, 33* (5), 12 – 18.

Donald, M. (1991). *Origins of the modern mind: three stages in the evolution of culture and cognition*. Harvard University Press.

Driscoll, M. P. (1994). *Psychology of learning for instruction*. Allyn & Bacon.

Karmiloff-Smith, A. (1992). *Beyond modularity*. MIT Press.

Laurel, B. (1993). *Computers as theatre*. Addison-Wesley Professional.

Laurillard, D., Stratfold, M., Luckin, R., Plowman, L., & Taylor, J. (2000). Affordances for learning in a non-linear narrative medium. *Journal of Interactive media in Education*.

Lieblich, A., Tuval-Mashiach, R., & Zilber, T. (1998). *Narrative research: Reading, analysis, and interpretation (applied social research methods)*. Sage Publications.

Luckin, R., Plowman, L., Laurillard, D., Stratford, M., Taylor, J., & Corben, S. (2001). Narrative evolution: learning from students' talk about species variation. *International Journal of Artificial Intelligence in Education, 12*.

McEwan, H. (1997). The functions of narrative and research on teaching. *Teaching and Teacher Education, 13* (1).

Piaget, J. (1951). *Play, dreams and imitation in childhood*. Heinemann.

Pléh, C. (2003). Narrativity in text construction and self construction. *Neohelicon, 30* (1).

Polkinghorne, D. E. (1988). Narrative knowing and the human sciences. State University of New York Press.

Propp, V. (1971). *Morphology of the folk tale*. University of Texas Press.

Stanford Encyclopedia of Philosophy. http://plato.stanford.edu/entries/behaviorism.

Sugiyama, M. S. (2001). Food, foragers, and folklore: the role of narrative in human subsistence. *Evolution and Human Behavior, 22*.

Szilas, N. (1999). Interactive drama on the computer: beyond linear narrative. In *Proceedings of the AAAI fall symposium on narrative intelligence*. AAAI Press.

Turner, P., & Turner, S. (2003). Telling tales: understanding the role of narrative in the design of taxonomic software. *Design Studies, 24*.

Vogler, C. (1999). *The writer's journey: Mythic structure for storytellers and screenwriters*. Pan Books.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Weaver, W., & Shannon, C. (1949). *The mathematical theory of communication*. University of Illinois Press.

Wiener, N. (1948). *Cybernetics, or control and communication in the animal and the machine*. John Wiley.