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CHARACTERISTICS OF COMMUNICATIVE INTERACTIONS BETWEEN CHILDREN WITH MULTIPLE DISABILITIES AND THEIR NON-TRAINED TEACHERS:

EFFECTS OF AN INTERVENTION PROCESS

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Note

Although English is the language used in this dissertation some Appendices are not in English. These appendices include materials for which Portuguese was the language used, such as data collection examples and intervention programs, which the researcher considered that might be kept in the original language

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ABSTRACT

Children with multiple disabilities often do not use speech to communicate. Communication with such learners requires the use of non-linguistic modes of communication that are not always mastered by teachers and other adults in school.

This study intended to describe the communicative characteristics of interactions between two multiple disabled non-speaking children and their teachers. Characteristics of interaction of two teacher/ child dyads as well as an intervention process designed to respond to teachers' communicative needs are described through the use of qualitative and quantitative methods.

Results indicate that teachers miss opportunities for communication with learners with multiple disabilities and that an intervention procedure that decreases the number of behaviors that are not responded to by teachers does not substantially change interactions. Issues emerged from data analyses that need to be attended to when interacting with learners who do not use speech to communicate. A discussion of such issues is included in the discussion of results.

Results of data analysis support the development of suggestions for practice aimed at helping teachers with no training in special education plan their communication intervention with learners with multiple disabilities.

RESUMO

As crianças com multideficiência frequentemente não usam a fala como modo de comunicação. A comunicação com estas crianças requer a utilização de meios não linguisticos de comunicação que nem sempre são do conhecimento dos professores nem de outros adultos na escola.

Este estudo tem como objectivo descrever as características da comunicação entre duas crianças com multideficiência e as educadoras que com elas trabalham. Através de metodologias qualitativas e quantitativas são descritas as características das interacções entre duas díades criança/educadora, bem como um processo de intervenção destinado a responder às necessidades comunicativas expressas pelas educadoras.

Os resultados indicam que as educadoras perdem oportunidades de comunicação e que uma intervenção centrada na redução do número de comportamentos não respondidos pela educadora não altera substancialmente as interacções.

A análise de dados permitiu a identificação de aspectos que necessitam de ser tidos em consideração nas interacções com alunos com multideficiência que não usam a fala para comunicar. Estes aspectos são discutidos no capítulo de discussão de resultados.

Os resultados da análise de dados servem de base ao desenvolvimento de sugestões para a prática destinadas a auxiliar professores/ educadores não especializados no planeamento da sua intervenção a nível da comunicação com crianças multideficientes.

RESUME

La communication chez les enfants pluri-handicapés se fait souvent à l´aide de moyens non verbaux qui ne sont pas toujours connus des professeurs ni des adultes qui s'occupent de ces enfants.

Cette étude présente une description des caractéristiques de la communication entre deux enfants pluri-handicapés et leurs professeurs respectifs. Les interactions entre les deux enfants et leurs professeurs, ainsi qu'une intervention portant sur les besoins de communication des professeurs, sont décrites à l'aide de méthodologies qualitatives et quantitatives.

Les résultats indiquent d'une part que les professeurs perdent des opportunités de communication et, d'autre part, qu'une intervention visant à réduire le nombre de comportements auxquels les professeurs ne répondent pas n'altère pas les interactions.

L'analyse des données de recherche indique qu'une multitude d'aspects doivent être pris en compte dans les interactions avec des élèves qui n'utilisent pas la parole pour communiquer. La discussion de ces aspects se fait dans le chapitre de discussion de résultats.

C'est en fonction des résultats de l'analyse de données que sont avancées des suggestions d'intervention adressées aux professeurs sans formation spécialisée qui travaillent avec des élèves pluri-handicapés .

INTRODUCTION

The Role of Communication

Children with multiple disabilities often do not use speech or any other language form to communicate. Nonetheless, when immersed in a context or routine with which they are familiar, they do communicate through the use of forms such as movement, smiles, and manipulation of objects (Siegel-Causey & Guess, 1989). Partners in learners' environments are therefore challenged to discover how the alternate modes these individuals use to communicate can be transformed in communicative interactions that will allow people with multiple disabilities to discover and enjoy life to their full potential.

Research has not yet provided sufficient information on how these children learn, what can school do to teach them appropriately and how can services better meet their unique needs. But there is little question that unless children are able to interact with environments and communicate with people in those environments, their developmental process will be seriously affected and their access to school opportunities will be decreased.

More than just a skill, the ability to communicate effectively is an art. This "art" becomes a real challenge when partners in communication cannot use speech as their usual form of communication. The absence of standard forms of communication interferes with the communication process and creates additional difficulties in the establishment of meaningful interactions and learning.

Through communication people establish links with both other people and the environment. People who cannot use conventional language forms are therefore limited in their ability to enjoy family interactions, school learning opportunities and social life in general.

The ability to engage in conversation with children who do not speak has been considered since van Uden's work with deaf children (van Uden, 1977) as an important basis

for learning. Referring to children with deafblindness, van Dijk (1989) also stresses this point by saying that the true educator of these children is the one who is able to engage in conversation with them.

Bruner (1986) emphasizes the need for human interaction as a basis for development and knowledge acquisition by stating that:

> "We need to get away from the image of the child operating on his or her own. I want to look at the development of the child in the context of human interaction. Human knowledge and its acquisition are social-dependent on language, on stored culture, on social modes of transmission. We have not looked at those matters closely enough, given our preoccupation with individual achievement. Now it is the time to begin" (quoted in Hall, 1982, p.63).

How do children with multiple disabilities access meaningful information from the world around them? What do these children learn in the absence of effective means of communication that lay ground for successful human interactions?

Learners with multiple disabilities are often quoted as being unable to communicate, non-interested in the environment and unable to learn. Still, for these abilities to be achieved children need partners who understand their needs and who respond to their communicative efforts with positive and rewarding responses.

Communication happens in partnerships. It is impossible to communicate alone. There is a need for a partner, a need for experiences to share and a need for ways to express oneself. Sharing a mode of communication and an understanding of the subject of communication are, therefore, necessary tools for effective communication.

Whenever partners using non-conventional forms of communication engage in communicative interactions, time is a major concern. It requires more time than average to communicate with someone who does not use speech as a language form. It is not always

easy to wait for a response or to give a turn in conversation to someone who does not speak. How long do partners maintain themselves in the process of communication if it takes too long a time to get their messages through? Do partners take the time and use appropriate forms to interact with the learner with multiple disabilities in order to share information with the required detail? Do partners try to speed up communication? How long do partners keep themselves engaged in communication using non-linguistic forms such as objects, pictures, or any other communication modes that are used by children and adults with multiple disabilities?

Empathy, as the ability to share emotions and feel into the other's experience, is crucial in this process. It is the role of the partner without disabilities to develop and maintain ongoing empathy that ensures communication as a meaningful process. Children and adults with multiple disabilities often do not have the ability to seek out and provide for meaningful situations that will enhance their communication opportunities with different partners. Adults with no handicaps who are in daily contact with this population should, therefore, actively search for and expand on situations that provide opportunities "to learn, to love, to live and to play" (McLetchie, 2000).

Schools have a major role in fostering the communication process. For learners with multiple disabilities who do not use speech, communication does not happen spontaneously. Communication, much as any other subject learners with multiple disabilities may learn, needs to be taught explicitly and requires trained and committed teachers to fulfill this task. By teaching learners to communicate effectively, teachers provide them with a powerful tool to access the world and establish interactions.

Background

As a consultant for programs serving children with multiple disabilities the researcher has often noticed that communication, although regarded as a major concern by

teachers, is more often considered as another handicap than as a subject that requires specific training and that needs to be considered in the curriculum. Teachers often assume that children with multiple disabilities understand speech as long as they are not deaf. Rarely do teachers interpret a learner's non-response as a consequence of not being able to understand speech: the fact that learners do not respond to teacher's spoken initiations is often considered either as a refusal to communicate or an inability to use speech. Such an assumption leads to fewer expectations about the learner's communicative abilities and reduces teachers' commitment to developing communicative interactions. This is particularly true for teachers with no previous training in multiple disabilities and in the communication needs of this population.

A particular interest in the area of communication led the researcher into observing communication interactions between children with multiple disabilities and their teachers. Observed difficulties seemed to be related to: 1) teachers' lack of knowledge and expectations about communication issues, particularly about alternative ways to communicate in the absence of speech, 2) lack of meaningful activities that provide for meaningful contexts and support interaction opportunities, 3) communication not being considered as a central issue in the development of programs. These observations created the need for the presented study, and oriented the development of the research questions.

Research Questions and Methods

The two main questions supporting the development of this study are the following:

- What are the communication characteristics of interactions between non-speaking multiple disabled children and their teachers in school settings?

- How does intervention impact in the communicative interactions of non trained teachers and their non-speaking multiple disabled children?

A set of specific research questions was defined as a result of these two initial questions. The specific questions that oriented study design and methodology are the following:

1. What are the communicative forms and functions used by children?
2. What are the communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
5. Why do teachers miss opportunities for communication?
6. What are teachers' expectations about communication with these children?
7. Do teachers miss fewer opportunities for communication after an intervention procedure?
8. Does intervention improve teachers' interactions with children with multiple disabilities?

Appropriate methodology for these questions included observations in classrooms, systematic coding of videotaped interventions, and interviews. An instrumental case study design (Stake, 1995) involving two case studies looked at two dyads of learners with multiple disabilities and their teachers. These two dyads formed the unit of analysis that provided information for data generation. In both cases teachers were having their first experience in the education of children with multiple disabilities. Time boundary for this research was the school year of 1999/2000.

Several reasons support the decision to choose case study as a possible design. The main reason results from research questions, which suggested the need to explain underlying processes of communication. This required in depth observations and descriptions of teacher/child interactions.

A second reason arises from the fact that the population of children with multiple disabilities is diverse and very unique. Therefore homogeneous groups could not be defined and studied.

A third major reason is related to the growing changes noticed in the field of research in psychology. As it is pointed out by Fishman (1999), in his discussion about the results of theory testing models, these models have limited impact in social change. That "sets the stage for a fundamental rethinking of the nature of psychology as a discipline. And it is from this environment that a new, case based, pragmatic psychology springs" (Fishman, 1999, pg 5).

Impact of the Study

In the school year of 1999/2000 a total amount of 1176 learners with multiple disabilities was detected through special education services of the Ministry of Education in Portugal. Data from non-profit organizations (CERCI's)[1] reported for the same school year an amount of about 100 cases of multiple disabilities being served by these organizations.

No data was available related to the background of teachers working with these learners. Still, observation has shown that teachers working with learners with multiple disabilities often do not have any training either in multiple disabilities or in any other area of special needs. No official guidelines exist assuring that professionals serving learners with multiple disabilities have appropriate training in this particular area of education.

In teacher preparation programs there is no organized policy that guarantees training to be available in multiple disabilities. Some official schools preparing teachers in special education have included in their programs the area of multiple disabilities. However, in reality a limited amount of teachers have been trained. In the last three years, due to organizational problems, there has been no training in multiple disabilities in official schools.

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[1] Cooperativas de Educação e Reabilitação de Crianças Inadaptadas

Even though some in-service training programs offer training in the area of multiple disabilities, such training is not always available for teachers working with learners with multiple disabilities for the first time.

As a consequence, learners with multiple disabilities are often served by programs in which teachers have no appropriate training and, therefore, do not have the means to develop intervention plans that respond to learners' needs. These needs include the need for successful communicative interactions that set the basis for communication development and learning.

Definitions

In order to elucidate about terms used in this dissertation, definitions are provided for the following terms: 1) communication, 2) interaction, 3) language, 4) speech, 5) turn-taking, 6) joint attention, 7) coordinated attention, 8) intentionality, 9) non-symbolic behavior, 10) symbolic behavior 11) prelinguistic communication, 12) non-linguistic forms of communication, 13) social interactive turns, 14) content turn taking, 15) initiations and, 16) persons with multiple disabilities.

Communication is a process by which individuals exchange information and convey ideas (Owens, 1990). This includes linguistic and nonlinguistic means.

Interaction is the result of individuals affecting each other. For the purpose of this study, the term interaction relates to actions that do not convey symbolic messages.

Language is a social shared code use under certain rules defined by a community (Owens, 1990).

Speech is a set of oral neuromuscular movements aimed at producing linguistic sound units. Speech is one possible form of communication. Other forms such as signs or written words can be used to express language (Owens, 1990).

Turn taking is the alternate sequence of turns between partners in communication. It is a basis for conversation.

Joint attention is an attentional state during which the child and the partner share a site of interest (Adamson and Chance, 1999). It is the ability to relocate attention to a target because it is the object of another person's attention (Deak, Fasel and Movellan, 2001).

Coordinated attention refers to the ability to shift attention between objects and partners in an interaction (Bakeman and Adamson, 1984).

Intentionality is the ability to understand that a message will be received and acted upon by a listener (Westling and Fox, 1995).

Nonsymbolic behavior refers to the use of informal and individual communicative skills. These skills are mainly unintentional and highly reflexive in nature (Downing and Sigel- Causey 1988). Nonsymbolic behaviors depend on referents that exist in the same time and space as the communicator (Downing and Siegel-Causey, 1988).

Symbolic behavior - refers to the use of symbols to represent reality. These symbols can be objects, gestures, pictures and words (Downing, 1999).

Prelinguistic communication refers to the period of development before the child has a linguistic system (Wetherby et al.1999).

Non-linguistic forms of communication refer to communication forms that are not linguistic in nature. This includes nonsymbolic behaviors such as crying and smiling, and symbolic ones such as objects of reference and pictures.

Social interactive turns are person-to-person interactions that are ruled by time, rhythm, synchronicity and empathy. Such interactions do not include attention to objects or events.

Content turn taking refers to interactions that have a subject of attention such as an object, a person or an environment.

Initiations are behaviors that are responded to by a partner and therefore initiate a communicative act. Not all behaviors need to be intentional in order to initiate interaction. *Persons with multiple disabilities* are persons who have " severe to profound mental retardation and two or more additional disabilities and/or special health care needs." (Orelove & Sobsey, 1991, pg 1). According to TASH[2], "these people include individuals of all ages who require extensive ongoing support in more than one major life activity in order to participate in integrated community settings". (Westling & Fox, 1995, pg 3).

Organization of the Chapters

The first chapter includes the literature review, which focus on aspects related to the following issues: 1) definition of communication, 2) communication development and, 3) learning, communication and multiple disabilities.

Chapter two addresses the methodologies used to conduct this study. Theoretical foundations are provided for all methodologies included.

In chapter three methods of data generation and data analysis are described. Description details procedures for data gathering and data analysis according to each methodology.

Chapter four presents results of data analysis. Data analysis concerns both qualitative data generated from participant observations and interviews, and quantitative data resulting both from systematic observations supported by videotapes and the use of a Likert-type scale. Results of assessment of the intervention process are also presented based on data from both systematic observations and the Likert-type scale.

Results are discussed in chapter five together with partial conclusions emerging from data analysis. Research questions are considered separately in this discussion and a summary of findings is included after the discussion of each question.

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[2] The Association for Persons with Severe Handicaps

Chapter six highlights implications of findings in future practice. Issues of teacher preparation as well as implications for direct intervention with learners with multiple disabilities are taken into consideration. A graphic model is presented that supports the development of communication intervention plans for learners with multiple handicaps who do not speak. Suggestions of strategies to be used are also included.

Chapter seven presents a summary of the study, discussion and conclusion. The discussion section of this chapter includes limitations and suggestions for future research.

The next chapter presents a literature review related to the subjects of communication definition and communication development, and to the communication and learning challenges faced by learners with multiple disabilities.

LITERATURE REVIEW

This study focuses on the communicative interactions between children with multiple disabilities and their teachers. In this chapter relevant literature is reviewed pertaining to the following topics: 1) definition of communication, 2) communication development in normally developing children, 3) learning, communication and multiple disabilities and, 4) developing interactions. The discussion of these topics provides a framework for the understanding of the communication problems faced by teachers and children with multiple disabilities in their interactions.

Communication is a spontaneous and effortless process. Most people do not even notice or think about it. It is not uncommon to realize how difficult it is for someone to reflect on its own communication processes.

The absence of communication is virtually impossible, according to Watzlavick, Beavin and Jackson (1967) who state that it is "impossible not to communicate", because human beings display behaviors and all behaviors have a potential for communication.

Historically, children's communication development is a quite recent matter of study. Although communication as a subject has been already addressed by Aristotle 335 year B.C. in his rhetoric courses, (Trenholm, 1999) it was not until the 18th century that people started to become interested by the way children were brought to communicate (Lock, 1999).

Apparently communication is a largely innate process that only requires the presence of another being in order to be activated. Still, Burgoon, Hunsaker and Dawson (1994) believe that the communication process " must have an impact on someone" to be called communication. This impact involves "the ability of the sender to take the receiver's capacity to understand into account" (Shatz, 1983). The nature of this impact will be discussed below.

Language is the most conventional means of communication. Most of the available literature on communication focuses on the use of structured symbolic codes, namely on verbal language, as the basis for communication, leaving little space for the discussion of non-linguistic means of communication. In addition to that, non-linguistic codes are most often discussed as part of the process in which verbal language plays a major role. The fact that some children/adults who are deprived of the ability to develop/use language need a non-linguistic approach to communication is often overlooked. Nevertheless, for those persons non-linguistic communication becomes the major means of communication.

The question of whether a behavior should have a symbolic value in order to be considered communication is often brought to discussion. Is there a need for codes to call a process a communicative one? Do people always send symbolic messages when they communicate? Is the symbolic characteristic of the message transmitted by the sender or perceived by the receiver? A person who takes a fork in her hand waiting for food to be presented means that she is hungry or that she is in a hurry to start eating? Is that same person intending to communicate?

Context, in the example of the raised fork, can provide for additional clues that help understand such behaviors, which in itself are not symbolic. The person might have only twenty minutes for lunch break, or might have skipped breakfast. But there is little question about the person wanting to communicate by raising her fork. It is mostly the receiver that interprets the behavior, and not the sender that expresses communicative intent. When clues are not clear, the receiver assumes meaning that is not always intended by the sender.

Meaning becomes a crucial issue in defining communication and it can be attached to messages both by receiver and sender. Does that mean that if a message is misunderstood there is no communication? According to Shatz (1983), a misunderstanding occurs when "interpretative knowledge is not shared by participants", which does not deprive a

misunderstanding from being part of a communication process. It should more appropriately be called inefficient communication, as it is the result of the two partners not being successful in conveying meaning.

In many expressed behaviors, intention is not always clear, particularly in what concerns non-linguistic behaviors, which cover about 60% of the social meaning in interpersonal exchanges (Burgoon, Buller & Woodall, 1989). Such non-linguistic behaviors, which accompany, substitute or complement our verbal messages have the power of changing verbal meaning and, at times, totally contradict it. Someone with a tense posture, high pitch voice, abundant non-targeted movement and frowned face who answers "nothing, I am just fine" when asked what is bothering her can hardly be understood just from the verbal message produced. The amount of non-linguistic information the person transmits while speaking is enough for the partner to understand that something is wrong. The combination of verbal and nonverbal messages also tells the receiver that the person does not want to speak about what is bothering her.

Defining Communication

There are several definitions of communication in the literature. Dance (1970), in the beginning of 1970, identified 126 published ones. Differences in definitions relate to issues that are sensed by the authors to be more or less relevant to the communication process. Some of these issues raise questions that must be answered to fully understand the diversity of definitions presented. Some of these questions are: a) what is a communicative behavior? b) is there a need for another human being to be present to turn a behavior into a communicative one? c) does communication always imply a response? d) is it necessary that the receiver attaches meaning to the message? f) are non-intentional behaviors part of the communication process? g) is it the sending or the receiving of the message that defines communication?

In an attempt to increase an understanding of what communication is, these questions will be discussed below.

What is a communicative behavior?

Not all behaviors are communicative although any behavior can be said to have a potential for communication. A person sitting on a bench, who smiles because she feels the sun on her face can hardly be considered to be communicating. Still, if another person reacts to the smiling with a comment e.g., " nice sun, isn't it?" then communication happens, not because the person smiling wants to communicate, but because another person acted as receiver of a non-intentional message and responded to it.

Communicative behaviors are, thus, not always verbal, and not always intentional. The meaning attached to a behavior by the receiver makes it possible for a non-intentional behavior to become part of a communication process. The importance of the receiver in this process stresses the importance of a reactive human being as part of the communication process.

Does communication always include a response?

Menyuk et al. (1995, p.145) indicate four possible situations: a) the behavior is intentional and there is a response; b) the behavior is nonintentional and there is a response: c) the behavior is intentional and there is no response, and d) the behavior is nonintentional and there is no response. These situations consider intentionality and response as the basis for defining a communication act. Other authors (Burgoon, Hunshaker and Dawson, 1994), while still considering the same four different situations, stress that the most important is the ability for the receiver to perceive the intent to communicate and not to provide a response. This approach directs attention to the need to perceive intentionality, but doesn't consider the receiver's response, whereas the approach suggested by Menyuk et al.(1995) relies on the

presence or absence of a response independently of the behavior having been considered intentional.

As in the example of the person smiling, communication happens even when the person initiating it doesn't have a communicative intent. If a receiver interprets a nonintentional behavior, that person initiates a communicative process.

But not all behaviors are interpreted by a receiver. When a nonintentional behavior is not interpreted by a receiver communication does not happen and it cannot be said that a communication failure happened. This would only have been the case in the third situation mentioned by Menyuk et al., when an intentional behavior is not interpreted and responded to by a partner (Menyuk et al, 1995).

Is message meaning important in the communicative process?

"Communicative interaction emerges in the form of negotiation of shared meaning" (Nafstaad & Rodbroe, 1999). From a pragmatic perspective, meaning of verbal language is the result of the use of codes in social interactions.

Linguistic messages have specific contents defined by the community, which are better perceived in context and through conversation. Context in which communication occurs is relevant because it clarifies content, adding information that helps the receiver extract the intended meaning of a given verbal message. Still, because they are coded, linguistic messages carry a meaning of its own which is not totally dependent on contexts.

Meaning of non-linguistic messages depends more on context and interaction exchanges, and less on codes. For individuals using only non-linguistic messages meaning is constructed through interactions based in significant situations and using concrete forms of communication such as objects, natural gestures or drawings. Meaning is lost when someone exhibits a non-linguistic behavior that is not understood by a receiver. Still, another person might interpret the same behavior and respond to it, thus creating an opportunity for the

behavior to become meaningful. Whether it is the acknowledging or the understanding and responding to behaviors that creates communication is still a matter for discussion. What is clear is the need for meaning to be shared so that communication happens.

Are nonintentional behaviors part of the communication process?

Intentionality has been defined by Weatherby and Prizant as the deliberate pursuit of a goal (Weatherby & Prizant, 1989). For Bates, intentionality is a "signaling behavior in which the sender is aware a priori of the effect that a signal will have on the listener" (Bates, 1979). These two definitions express some differences. Bates' definition points to a reflective process in which the sender is aware of the possible consequences of the communicative initiation. Weatherby and Prizant's definition reflects a more target oriented process in which sender's wishes are the most important part of the process. According to these definitions there is always a response either expressed when the receiver reacts and sends a message back, or non expressed when the receiver decides to ignore the message.

Nonintentional behaviors can be part of a communication process although not in the same way as intentional behaviors, which in itself always define a communication process. Intentional behaviors are initiated with a purpose and the absence of a response still makes the process a communicative one. An absence of a response is still a response. Nonintentional behaviors do not have a communicative value in itself. It requires someone to receive and interpret it in order to become communicative. Intentionality is, therefore, a crucial aspect of communication. The point is where is the intentionality situated: is it in the sender or in the receiver? Cronkhite (1976) suggests that "communication occurs when a human being responds to a symbol", thus focusing on the response rather than on the initiation.

The possible combinations between communicative intent and the receiver's perception of this intent will therefore define the existence of communication, more than the the nature of the behavior itself (Burgoon, Hanshaker &Dawson, 1994, Menyuk et al., 1995).

What role does non-linguistic behavior play in the communication process?

Messages are not only verbal in nature. A good part of the meaning expressed by a message relies on the non-linguistic part of the message. These non-linguistic behaviors expand and clarify the verbal message, and best convey personal and emotional information (Trenholm 1999).

Non-linguistic behaviors can be described according to three different attributes, a) kinesics, b) proxemics and c) chronemics. Kinesics refers to the use of body movement. It covers the visual aspects of behavior, such as posture, gestures, facial expressions and eye behavior.(Burgoon, Guerrero, 1994). Proxemics takes into account the way partners manage and negotiate space between them in their interactions. Chronemics deals with time issues related to the communication process. These elements of communication are both culturally and individually defined and are an important part of the communication process.

Non-linguistic behaviors, such as eye gaze, pointing and natural gesturing, emerge as the only possible forms of communication for someone who does not use the code of the community in which he/she is included. Examples of these situations are people who are living in different cultures, and people who didn't manage to develop communication through the use of language in their own culture. Children and adults with multiple disabilities who do not use speech are included in this group. For these persons non-linguistic codes become the most used communication forms. Partners who use the same communication forms are, therefore, vital for the development of communication opportunities

A definition that fully absorbs all the characteristics of communication is virtually impossible. According to their beliefs authors have conceived definitions that try to synthesize and express some of the issues mentioned above.

For the purpose of this thesis, communication will be defined according to the National Joint Committee for the Communicative Needs of Persons with Severe Communication Disabilities (1991):

> Any act by which one person gives or receives from another person information about the person's needs, desires, perceptions, knowledge or affective states. Communication may be intentional or unintentional, may involve conventional or nonconventional signs, may take linguistic or non-linguistic forms and may occur through spoken or other modes (p.2).

Communication Development

Communicative skills

Children are born with innate capacities for interpersonal communication (Trevarthen, 1982), including the ability to use initiation behaviors (Carlson and Bricker, 1982, Trevarthen, 1982). These capacities develop into meaningful communication abilities through early interactions between children and their primary caregivers (Dore, 1985). Adult contingent responses to potentially communicative behaviors, defined as "caregivers' behaviors that are closely related to the infant's signals in time and function"(Chen, 1999, p.33), facilitate communication development (Yoder et al, 1998) and provide children with an expectation about the influence that their behaviors have in the world around them (White, 1959). This encourages children to communicate by letting them feel that primary caregivers value their behaviors as attempts to interact. Contingent responses assume, therefore, a particular role in the development of early interactions providing children with a sense of control and emotional well-being.

The development of communicative skills has been subject of research since the late 70', both in the contexts of communication development and of social emotional development. It is still a matter of debate what is the role of communicative skills in the scope of child development and of language development in particular. Bates et al (1979) and also Wilcox and Shannon (1998) considered that prelingusitic skills are a precursor of normal language development.

Some studies suggest that a continuum can be noticed between: a) early communication patterns such as turn taking or joint attention and later pragmatics skills required in conversations and, b) early gestures and the use of the first words, (Johnson, Davis and Macken, 1996). Indications of possible relations between early communicative behaviors and the development of syntax have not been found. For this reason, authors such as Shatz (1983) and Bruner (1990) state that communication and language should be considered separately. Although no specific prerequisites for latter communicative functions can be found in early communicative behaviors, it is accepted that underlying systems such as the ability to shift attention from person to objects is necessary to trigger the use of the first spoken or signed word (Lock, 1999).

The concept of pragmatics, discussed by Bates (1976) originated a paradigm shift in the analysis of the development of communication and language. Communication abilities instead of language and speech abilities became the focus of attention. Context, the role of partners and the use of nonverbal behaviors as ways to convey communicative intent, were identified as essential factors in the communicative process. Research on socio-emotional development, particularly in what concerns development of joint attention skills and its influence on affective intersubjectivity (Mundy et al, 1992; Stern, 1985) also contributed for a deeper understanding of mechanisms of early communication.

Bates (1976) identified three stages in communication development: a) the prelocutionary stage, during which behaviors are not yet intentional but influence the caregiver and originate a response; b) the illocutionary stage, during which the child uses sounds and gestures to communicate, and c) the locutionary stage, when the child starts using words to communicate purposefully.

From a pragmatics perspective, communication skills develop within the context of social and emotional relationships with others (Wetherby, Alexander and Prizant, 1998). Caregivers and mothers involve themselves in conversations with their babies long before they can produce words. For Dunst et al. (1990) mutual efficacy of caregiver/child interaction is an important factor in the success of communication development. When signals from both partners are read and meaningfully responded, interactions become more predictable and communication increases. Over time, both partners develop a sense of efficacy that supports the development of further skills.

A transactional model of communication development was proposed (Kublin, Wetherby, Crais and Prizant, 1998; Sameroff, 1983) to analyze interdependencies among children, caregivers and social contexts. Such a model looks at children as active participants who learn to affect the behavior of others. Caregivers' contingent responses, in turn, affect children's behavior. The way children and caregivers are able to read each other's signals, determines to a certain extent the level of success of the interaction as a communicative opportunity. Another relevant issue in the scope of the transactional model is the quality of the environments the child is immersed in, which also affects interaction creating context and content opportunities for children and partners to initiate communication.

An analysis of the literature on early communication interactions points out to three essential landmarks in communication development: *turn taking* (Golbart & O'Kane, 2000;

Bruner and Sherwood, 1983), *intentional behavior*, (Reddy, 2000; Bruner, 1983), and *joint attention* (Adamson & Chance, 1998).

Turn-taking

Turn taking is an alternate sequence of information exchanges implying the ability to initiate, maintain, interrupt and terminate communication between partners. Turn taking episodes can be noticed between mother and child, as early as in the first months of the baby's life. During turn taking sequences, "...the adult talks to the baby and leaves spaces for the baby to fill with sounds or actions. The baby's action is taken as a response and the 'dialogue' continues" (Golbart and O'Kane, 2000, pg 7). Turn taking, as a social skill, is fundamental for most communicative exchanges (Bruner and Sherwood, 1983).

Imitation is an essential part of early turn-taking interactions. Mothers begin interactions by imitating their babies' vocalizations. Babies attend to mothers' behaviors and take their turn in interactions repeating and increasing vocalizations that are again imitated by the mother. At some point in development mothers eventually change interaction patterns giving babies an opportunity to imitate their behaviors.

Children engage in turn-taking activities as early as in their second/third month of life. Caregiver and child share turns in basic communication exchanges that involve the use of eye contact, gestures and affective signals (Mundy and Willoughby, 1998). These exchanges require that only one of the partners sends a message at a time, and that specific signals tell the other partner when to take his turn. Brazelton, Koslowski and Main (1974) refer to these exchanges as having a cyclic and synchronous nature, creating a basis for the child to grasp the notion of reciprocity. In a study of mother child early interactions, Trevarthen (1977) describes the features of such interactions as having characteristics that are similar to music. Mother and child both time their acts to fit into the same rhythmical pattern, in which the precise timing of the response is of more importance for the ongoing of

the interaction than the nature of the response itself. Difficulties in reading child's signals and establish turn-taking opportunities creates asynchronous interactions that usually are not mutually satisfactory and may have consequences in the communication process.

Intentionality

Intentionality is the ability to understand that a message will be received and acted upon by a listener (Westling and Fox, 1995). It requires, according to Bruner (1975) an awareness of self and others that sets the child's interest into something or someone outside of himself. Searle (1984) makes a distinction between intentional states, which are mainly representation of intentions, and intentional behaviors, which are a goal directed activity.

Intentionality is discussed by some authors as a prerequisite for a behavior to be considered communicative. For Shatz (1983) nonintentional behaviors should not be considered as part of a communication process. Still other authors (Sigafoos, et al.2000) stress the fact that nonintentional behaviors should be considered as a *potentially communicative acts* taking into account that behaviors have a potential for communication as long as responded to by a partner (Cronkhite, 1976).

Reddy (2000), accounts for three main theories to be considered in the development of communicative abilities and the use of intentional behaviors. These theories are: the cognitivist theory, the social constructionist theory and the nativist theory.

The cognitivist theory defines intentionality as a goal directed process, in which consciousness of a goal and the means to achieve the goal are seen as two separate processes (Camaioni, 1993). According to such approach, communicative intentions "are *individual* and *mental* representations of specific goals" (Reddy, 2000, pg 27).

Using a cognitivist approach Camaioni (1993) stresses the importance of the sender of a message and of the previous construction of representations and knowledge about others, therefore relying on the child's intentionality to initiate the communication process.

Taking a different perspective Lock (1993) uses a social constructionist approach and looks at intentionality as the resulting product of a process of interaction. Any unintentional behavior can be treated as communicative whenever a receiver attributes meaning to it, therefore creating ground for communication. The social constructionist theory emphasizes the role of the partner as a potential interpreter of behaviors defining a communication process in which the child is not aware from the beginning of the possible consequences of his behaviors. It is the social component surrounding the behavior that provides for meaning and generates communication.

A third approach to intentionality is provided by the nativist approach. Communication, in this approach, is the result of innate abilities to perform a variety of actions, one being the ability to communicate (Trevharten, 1982). These innate abilities are the basis for the development of early interactions between children and their primary caregivers and have a strong emotional component.

The nativist approach argues that the infant's ability to develop actions directed to others is intentional from the beginning and that this intentionality grows more and more complex as communication develops. Still in itself intentionality should be considered as a given (Trevharten, 1982). According with the nativist theory, and particularly with Vedeler (1991), intentions precede mental representations and are not a consequence of the ability to use mental representations.

Communicative intention according to the nativist theory is object directed rather than goal directed hence being present in the act and directed to the object, as opposed to being necessary to plan the act and directed to the outcome.

Analysis of the presented theories, in particular the cognitivist theory and the socio constructivist theory, leads one to conclude about two different oissues subjacent to the development of communication and intentionality.

The cognitivist theory views communication development as being driven by the child's progressive ability to use tools to obtain ends. Children should therefore communicate with adults to fulfill desired needs.

The socio constructivist theory views communication development as being ruled by the desire to share thoughts and feelings with others. Communication according to this theory has a social function and development occurs because more partners and more needs for sharing occur.

Joint attention

Joint attention refers to the capacity of both child and partner to concentrate on and share a common interest (Adamson and Chance, 1998). It involves the child's ability to use objects to attract attention and seek for affective responses from adults (Bates et al, 1975) as well as to initiate affective exchanges (Jones et al, 1991; Mundy and Willoughby, 1998).The way caregivers respond to children's initiations, which Stern calls "affective attunement" (Stern, 1985), is essential in this process of joint attention providing children with positive feelings towards objects and events thus encouraging them to share experiences that involve these objects and events.

Throughout their first year of life children's ability to pay attention to people and objects is marked by three major transitions (Lock, 1999). A *first transition* occurs around two months, when children become motivated to direct attention to people. The *second transition* occurs around five months, when children's attention moves from people to objects. The *third transition* takes place around nine months, showing the child's ability to coordinate attention to both an object and a person. At this age children start searching adult's attention in order to act upon an object.

Following the first transition children become interested in social partners. They pay attention to persons who do things that interest them. Eventually they start pacing their

expressions with those of the partner, therefore creating a basis for more sophisticated turn taking interactions.

The second transition brings an apparent and sudden lack of interest in face-to-face interactions. Child's abilities to hold an object in their hands and to sit enlarge their views of the world making them interested in more than just people. Objects and events around become part of children's world and an interesting focus of interest.

The third transition is the ability to coordinate attention between people and objects and represents a major shift in the development of communication and interaction skills. It is, according to Mundy and Willoughby (1998) an index of socioemotional tendency in children.

During episodes of joint attention adults inform the child about the environment by providing him with experiences. These experiences usually occur within the zone of proximal development (Vygotsky 1978), therefore operating not just as socioemotional opportunities, but also as opportunities for further learning. Adults scaffold for children's learning by providing them with the appropriate information regarding the object that is the focus of their shared interest. In this process the child is actively involved in searching for information and the adult acts as information provider. The ability to engage in joint attention episodes defines a crucial landmark in the development of further learning skills as it is an indication of the child's ability to attend both to what happens in the environment and to what adults express about the same environment.

Forms, functions, contents and contexts of communication

Communication occurs as the result of interactive processes between children and their partners. In these processes four domains are to be considered: a) forms, b) functions, c) contexts and, d) contents of the communicative act.

Communicative forms

Communication forms are behaviors that express communication intents or that are interpreted as communicative by a partner. Such behaviors include a variety of *forms* ranging from non-linguistic forms, such as *smiling, crying, gestures, facial expressions, movements, change in muscle tone, vocalizations or objects,* to linguistic forms such as *speech* or *sign language.*

Children in their first year of life mostly function at a pre-linguistic level of communication. Although their ability to express information is confined to non-linguistic forms in their first months of life, their ability to understand other forms of communication soon increases. Long before they can utter their first word, children understand the meaning of contextualized words and of objects being handed out to them.

The use of objects to communicate encompasses the development of language in the first years of life. Referents must be present for children to be able to talk about them. Typically, conversations between one to two year old children and their caregivers are context based (Bernstein, D., Tiegerman, E, 1993). They talk about the "here and now", (Menyuk et al, 1995), which means that children still need to refer to the concrete forms of what they are talking about.

An analysis of the progress from non-linguistic to linguistic forms of communication, and the role that objects play in the development of communication, informs about the communication potential of children who have difficulties accessing linguistic means of communication. In the absence of more abstract forms of communication such as speech objects are a useful basis for communication and can be used to support the development of interactive skills.

This initial ability to communicate using prelinguistic forms of communication changes over time allowing spoken or signed language to become major forms of

communication. Still, the prelinguistic forms described before will continue to be used. Throughout our lives our communication system reflects a combination of both prelinguistic and linguistic communication forms of communication.

Forms and *modes* of communication are terms both used to refer to behaviors that have a potential for communication. Sternberg (1991) explicits that *modes* should have " an identifiable communicative intent on the part of the individual expressing the mode" (pp.73). This view is not shared by authors such as Sigafoos et al (2000), who define potentially communicative acts as being nonintentional behaviors that can become communicative because a partner implies intentionality to it.

Communicative functions

Early communicative behaviors, according to Bruner (1981), have three main functions: *behavior regulation*, *social interaction* and *joint attention*. Communication forms used by children in their first year of life are used to represent a variety of communication *functions*. Research has shown that as early as in the second year of life children will display a variety of communication functions that range from requesting items or changes in objects to calling for attention and protesting (Waterson & Snow, 1978).

Cirrin and Rowland, (1985) in their analysis of communicative behaviors of adolescents with severe learning disabilities described the following communicative functions: a) directing attention to self, b) requesting object, c) requesting action, d) protesting, e) directing attention to communication, f) directing attention to object, g) requesting information and h) answering. Similarly, in another study pertaining to challenging behaviors of learners with severe disabilities Donnellan et al. (1984) found four categories of interactive functions: a) requests, b) negations, c) declarations/comments and d) declarations about feelings.

Context

Context is defined " the interrelated conditions in which something exists or occurs" (Merriam Webster Dictionary). The context is "the world as realized through interaction and the most immediate frame of reference for mutually engaged actors" (Walsh, 1998). Individuals' interactions in particular places at particular times with particular goals therefore define unique contexts that grant shared meaning of the interactions.

Tietze and Rossbach (1984) in their analysis of the socialization environments in which children are immersed point out to two sets of characteristics: those that relate to the structures, including spatial, personal, organizational and attitudinal characteristics, and those that relate to the processes, including person to person interactions and interactions between a person and the environment.

The context of a communicative act in prelinguistic communication is mostly comprised by: a) physical components that surround the use of a communication form and support meaning, b) activities and routines occurring in the physical environment, c) people involved in the activity, d) time and e) the topic of interest. (Bruce, S. 1999)

Context factors such as the environmental settings in which the child is included influence the communication outcomes of the forms functions and contents being used. Similar forms and functions when used in different contexts may represent different messages and therefore convey different contents.

Interactions with nonspeaking individuals, who do not use abstract modes of representation, require context to be defined so that conversations can take place. It is the partner's role, in the case of children with multiple disabilities functioning at a prelinguistic level, to provide for clear contexts so that meaning is accessible to their partners.

Content

The content of a non-linguistic message is the actual message conveyed by a behavioral form. (Bruce, 1999) The same non-linguistic forms may convey different *contents* when expressed in different contexts. Message meaning is therefore strongly influenced by context.

Being exposed to normal life experiences impacts on children's ability to understand messages conveyed. Most of the communication acts happening during early childhood relate to real life experiences and are supported by strong visual components related to. physical aspects of the environment that are visually accessible for children

Normally developing children can easily pick up information from different contexts because they are continuously immersed in real life experiences. They live and act in various contexts, they know different people acting in those contexts, they are able to pick up clues from context with relative easiness. For children with multiple disabilities the access to contexts is often limited and fragmented, reducing their ability to understand contents of messages. Children with multiple disabilities do not move around easily, have sensory impairments that prevent them from accessing the environment, are not taken out as often as normal children do, and do not have as many peers as other children often do. All of these factors have a strong influence in the way children understand the contents of communication. It is not just the contexts themselves that support communication comprehension, it is the living and acting in different contexts that creates ground for more developed understanding of the world, and of the communicative acts that go with it.

The impact of conversation

Another relevant factor to meaningful communication is the development of conversation skills. These skills reflect the growing ability of partners to involve themselves

in turn taking experiences with the purpose of exchanging information. Hagood, (1994) defined conversation as "a dialogue requiring turn-taking around a topic of interest".

Through conversation children learn how to exchange information with a partner, what is expected from them in a communicative exchange, how they can get what they want by influencing their partners. Early turn taking, initiated by the mothers' imitations of children's behaviors, tunes in children and their partners and creates ground for longer and more detailed information to be exchanged. As Newson (1978) points out, "it is only because he [the child] is treated as a communicator that he learns the essential art of communication" (Newson, 1978, pg42).

Interactions between prelinguistic children and their caregivers happen with no need for words particularly in the case of infants. In the initial stages children and their caregivers mostly exchange affective states, which are mostly ruled by time and rhythm (Trevarthen, 1977). As the child develops protoconversations (Bateson, 1979; Snow, 1977) develop leading into more meaningful exchanges during which messages begin to have content related to daily experiences both in terms of events and of people. It is the development of these conversations that supports children's increased knowledge about the world. Relying on their perceptions only, without the opportunity to enlarge meaning through interactions with people in the environments would have been far too limited for children to understand what the world is about.

Grice (1975) provided a framework with principles for successful conversations, which include: a) quantity of information transmitted, b) quality of information transmitted, c) relevance of contribution and d) timing and logic of contribution. At the essence of these principles lays the assumption that both partners engage in conversation for the purpose of exchanging information and learning something new. Respect, meaningfulness and equal opportunities in taking turns are essential in this process.

Development of communication can be endangered by disabilities, with particular emphasis for the case of children with multiple disabilities. Failing to develop interaction and successful communication has important consequences in development in general and puts children at risk for learning.

Learning, Communication and Multiple Disabilities

Children with multiple disabilities who do not use speech to communicate are deprived from normal social interaction. This deprivation has consequences not only in children's immediate interactions with the world around but also in development and mental health. As stated by Tomasello (1999), a child who is not dynamically interacted with on a regular basis will not be nearly as healthy from a mental perspective. Referring to such a child, Tomasello states that:

> This child at some later stage would engage in very little causal thinking, very little mathematical thinking, very little reasoning about other people's mental states, and very little moral reasoning. That is because all of these types of thinking and reasoning come about either mainly in or only in the child's dialogical discourse interactions with other persons (p.190).

Education of children with multiple disabilities must therefore consider the development of interaction and communication not just as a way to establish contact between children and the world around, but also as a contribution to the development of further thinking abilities. In this section some of the challenges that such an assumption poses to educators and parents will be discussed.

Learning problems

Normally developing children receive information from various sources. They continuously and actively seek information and their learning processes are, in many ways, incidental. Communication and language, as the continuous input children receive from

people in the environment, add to this information shaping it, enlarging it and making every new experience more meaningful.

Children with multiple disabilities often do not actively seek information. Their access to the world is limited by their sensory, motor and cognitive limitations. Attention deficits related to the inability to select appropriate stimuli are often a characteristic of such population. The information they receive is often distorted and incomplete both by limitations itself and by the lack of frequent and meaningful experiences. Observational and incidental learning which are an important part of normal children's learning process are not used frequently by this population (Westling & Fox, 1995) requiring direct teaching of skills that normal developing children acquire without specific adult intervention. Everything a child with multiple disabilities learns must be taught.

Persons with multiple disabilities often show significant learning difficulties that have an impact in their educational outcomes. These difficulties result from 1) limitations in accessing the environment, 2) difficulties in directing attention to particularly relevant stimuli, 3) difficulties interpreting information and, 4) generalization problems. Sensory and motor problems, cognitive challenges, lack of diversified experiences and lack of communication opportunities are the main causes of these difficulties, creating specific challenges in the development of individualized programs for these learners.

In order to respond to these needs partners in general and teachers in particular should look for the best way to a) provide the learner with multiple disabilities with diversified meaningful and organized experiences, b) make sure that information provided and skills to be taught are useful and increase independence in the future, c) ensure generalization of acquired skills in meaningful situations and, d) search for the most appropriate ways to convey information by using communication means that suit the individual needs of the learner.

Diversified, meaningful and organized experiences

Teaching learners with multiple disabilities is a challenge. As mentioned before, incidental learning does not occur often thus transferring to teachers schools and parents the task of making life meaningful and accessible to these learners.

One of the consequences of having multiple disabilities is the reduced opportunity that these learners have to participate and enjoy normal life experiences (Ware and Evans, 1986). Going to a grocery store with their parents, being part of a group of youngsters visiting a museum, participating in family conversations or being responsible for house chores, are only a few examples of normal life activities that these learners often do not access and experience. A question remains if the lack of ability for incidental learning is caused by the disabilities itself or by the lack of diversified experiences that provide opportunities for normal cognitive operations such as comparing, associating, sorting, etc. Normal children perform such operations after being exposed to numerous opportunities that provide them with the necessary information. Children with multiple disabilities often lack those opportunities.

The need for a structure often pointed out as a basic need for a child with multiple disabilities is in our view necessary but, if taken to strictly, might also endanger learning opportunities. The structure that children with multiple disabilities need is the same as any other child. It is the way to access such structure that is most certainly different, as there are several issues that need to be taken into consideration when making structure accessible for learners with multiple disabilities. The most relevant issue is, in our view, access to time concepts such as now, later, before, after, in the morning, in the evening, etc. These are concepts that normal children pick up easily from experience associated with language. In the absence of both these requisites, children with multiple disabilities are left with a fragmented sense of what happens around them, which drives them into non-structured

situations that do not encourage learning. Vision itself, in the case of learners who do not have vision problems, is not enough to structure experience over time as vision is mostly a spatial sense providing for simultaneous information. Meaningful life experiences that create ground for communication opportunities have been considered as essential aspects of programs for learners with multiple disabilities. Research suggests that it is the type of learning experiences that are provided rather than the type of classroom setting (integrated or segregated) that is critical in fostering children's development. (Mahoney & Powell, 1988; Mahoney et al., 1992). Results of another study indicated that child-directed teaching strategies resulted in greater gains in communication skills for children with severe disabilities than did direct instruction (Yoder et al., 1991). McLetchie and Riggio (2002) stress the importance of children's active involvement in real life experiences as a way to learn about them selves and the world around\ and the essential role of communicative interactions in this process.

A second issue related to organized experience is the need for routines. Routines and calendars are fundamental strategies to support the development of structure and time concepts in programs for learners with multiple disabilities. (van Dijk, 1986).

Functional routines represent an useful basis for teaching learners with multiple disabilities (Neel and Billingsley, 1989). Cripe and Venn (1997) also stress the importance of the use of routines in programs for learners with multiple disabilities pointing out the systematic approach that such a strategy naturally brings into the program.

The use of functional routines increases opportunities for: a) anticipation, as children learn to know what steps come next, b) repetition, because functional routines are performed several times throughout the day, c) meaningful learning, as routines are embedded in natural contexts and skills to be learned belong to the same activities and d) feelings of success and

self-esteem as learners are aware of what is expected from them and what they should do to in order to be successful.

Increasing independence in the future

Access to academic learning in the traditional sense is often not possible for learners with multiple disabilities. Children with multiple disabilities do not learn to read or to do mathematics the same way other children do. On the other hand, as mentioned before, incidental learning usually does not occur thus reducing the amount of learning experiences for this population. Teachers and schools are therefore confronted with the need to redefine their role in order to respond to learner's characteristics and assure that learning opportunities are provided.

Because curricula for learners with multiple disabilities should respond to learner's individual needs, ecological assessment and intervention strategies (Brown et al. 1979) need to be carried out. Such an approach looks at learner's current and future needs as the basis for defining which areas to develop in individualized programs.

Schools, teachers and parents should cooperate in order to define individual educational goals embedded in functional programs so that learners can be exposed to meaningful learning of useful skills in natural contexts, which ultimately increase their participation in family and community life activities, their access to work and leisure activities whenever possible, and their possible independence in daily living and self care activities.

Functional academic skills, such as reading and mathematics, should be included in these programs as a way to enlarge access to information (Browder and Snell, 1993). Learners who can read their name, identify written tags, do basic counting or learn to read the time have enhanced possibilities of being involved in normal life activities. Although a symbolic functioning level is required for higher levels of reading and mathematics, basic

use of these abilities is possible for learners with lower symbolic levels i.e. learners with multiple disabilities.

Generalization of acquired skills

Generalization, as an ability to transfer and apply previously acquired knowledge and skills into new situations (Haring, 1988), is often said to be difficult for learners with multiple disabilities. Although cognitive deficits could be attributed the major cause of this inability, as learners with multiple disabilities fail to perform cognitive operations that lay the basis for generalization skills, it is also a fact that this population often lacks opportunities for diversified and meaningful experiences that support generalization and the use of learned skills. As Westling and Fox (1995) point out, the *train and hope* approach, which hopes taught skills to be generalized automatically, does not work with individuals with multiple disabilities.

Models of teaching which are often used with learners with multiple disabilities, in particular strict behaviorist models, usually approach learning from the perspective of breaking the whole into "manageable "steps, often teaching learners to perform steps of a task in a decontextualized way, expecting learners to perform the whole in meaningful situations. This approach might have negative effects on generalization. According to Chandler et al (1992), the type of behaviors to teach, the type of reinforcement to use and the level of fluency in task performance are criteria required for setting up strategies that support generalization. Wolery, Ault and Doyle (1992) stress the need to move instruction into generalization settings, i.e., skills to be learned should be taught in settings where such behaviors are likely to occur (real life settings) to guarantee generalization.

In the absence of incidental opportunities for learning and generalization, success in the use of previously acquired skills depend on adults creating opportunities to a) provide for real life learning experiences, b) encourage learners to use recently acquired skills in a

meaningful way, c) guide learners in the process of using learned skills appropriately and, d) teach learners how to identify situations in which those skills can be used.

It is also relevant to say that skills to be taught should be carefully selected as the most functional and appropriate for each individual, taking into consideration his unique living situation and families' expectations for his/her future. As long as chosen skills belong to each specific learner's individual life, there will be frequent opportunities for functional practice, which is an important point for generalization.

Search for appropriate ways to convey information

Although considered as the most common form of communication, speech is not a reasonable goal for many learners with multiple disabilities (Haring and Breen, 1989). Frequently these learners function at a prelinguistic level that requires considering non-linguistic forms of communication as a primary means of communication (Siegel- Causey & Guess, 1989, Downing, 1999).

For these learners the development of communication requires partners to be able to assess and respond to their non-linguistic forms of communication, which are similar to those used by normal developing infants in their first year of life. These forms include crying, smiling, facial expressions, movements, eye gaze, gesturing and objects. Because of the nature of these forms of communication, their content and function will be dependent on specific contexts in which they are used.

Access to contexts is often difficult for learners with multiple disabilities who do not have sensory and motor abilities to explore and engage in meaningful activities. In the absence of normal access to stimulation learners with sensory deficits often engage in stereotyped behaviors[3] aimed at providing them with some sort of sensory stimulation (van

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[3]rhythmical repetitive movements, apparently with no meaning.

Dijk 1989), or at attempting to explore the environment in their own and unique way (Nafstaad and Rodbroe, 1999).

Assisted opportunities for a large scope of life experiences are, therefore, extremely important for the development of children with multiple disabilities, with a particular emphasis on opportunities for the development of communication skills. These opportunities need to be supported by close interactions between children and caregivers that enhance the quality of communicative transfers (Miles & Riggio, 1999; Downing, 1999) therefore creating opportunities for learning about the environment.

Developing Interactions

Success of interactions between caregivers and learners with multiple disabilities depends largely on the ability of the caregiver to interpret and respond to learner's nonsymbolic forms of communication. Although parents of normal developing children respond to children spontaneously, research has shown that signals send by infants with developmental delays are more difficult to read and to be responded to by parents (Walden and Knieps, 1996, Clark and Seifer, 1983). Also, children with disabilities may have problems with reading parents' signals (Walden and Knieps, 1996). These difficulties may have important consequences in child's development, as parental responsivity to children's signals is related to later social and emotional development and to children's communication abilities.

Some authors suggest that learners with multiple disabilities are not as predictable as nonsymbolic normal developing children (Siegel-Causey et al, 1988). This might lead to a decrease of the quantity and quality of the caregiver's responses, as well as a possibility for asynchronous interchanges. Caregivers do not perceive learners with multiple disabilities as their partners in social interactions, which might in turn create less opportunity for the child to receive contingent responses. In such situations, caregivers tend to assume responsibility

for initiating and controlling interchanges (Hanzlik & Stevenson, 1986; Mahoney & Robenalt, 1986) without the guidance of children's signals and cues.

Siegel Causey and al (1988), looking at characteristics of interactions between mothers and their deafblind babies point out three aspects: sensitivity, timing and, contingency and predictability.

Sensitivity refers to the caregiver's ability to read and respond to children's unique behaviors. Children with multiple disabilities often do not show vocalization behaviors, which are behaviors more often responded to by caregivers of normal developing babies therefore requiring caregivers to learn to respond to other behaviors such as movement.

Timing of responses is difficult to keep when children's' signals are not understood by caregivers as communicative. Children with deafblindness often show less responsiveness and less interactive rhythmical skills, leading caregivers to respond at the wrong time, either by responding to quickly or by leaving some behaviors un-responded to. In some cases caregivers provide for over stimulation by continuously vocalizing and therefore creating less pauses, which decreases opportunities for the child to respond to or to initiate communication.

Contingency and predictability of caregivers' responses develop a sense of success of children's communicative attempts. Children learn that their behaviors are acknowledged by others. Still, contingency of caregivers' behaviors is often decreased as a result of unique characteristics of deafblind babies, such as non-responsiveness, limited response repertoire, reduced opportunities for social interaction or caregivers' feelings related to the disabilities.

The attachment process described by Bowlby (1969), through which the child develops a secure bonding with his primary caregiver allowing him/her to explore and access new opportunities for experience and learning, is endangered in children with multiple disabilities due to the described difficulties in establishing readable signaling systems. Visual

impairments have an important role in the attachment process and can cause additional difficulties for a child with multiple disabilities as it impacts in the development of eye contact between the child and his mother (van Dijk, 1986, Fraiberg, 1975). Children with a vision loss are therefore at risk for the development of secure relationships with their caregivers.

Ware (1996), points out to three aspects that might interfere in the development of successful interactions between learners and their partners. First, learners with multiple disabilities usually exhibit slow responses, causing teachers to respond instead of learners, to dominate interaction without waiting for their answers and to move into another subject before a learner has an opportunity to answer. Secondly, these learners give, in fact, fewer responses and their responses are more difficult to read. A third issue is that these learners use a communicative level that is, most times, not related to their age level. Teachers tend to either use speech because it is the expected appropriate form for learners' age level, or, when they use pre linguistic forms, to include contents in the interaction that match the needs of normal children that are at a pre linguistic level.

Communication goals

Due to the specific characteristics of the population with multiple disabilities, development of prelinguistic skills often does not lead towards the development of linguistic abilities. The goal of communication development for these learners is to provide them with communication means that help facilitate their development both cognitively and socio-emotionally in order to have: a) a better understanding of the world, b) a more secure basis for daily functioning, c) an ability to express needs and desires and, d) the curiosity to explore new situations. Expression of these needs can be developed through the use of nonsymbolic or symbolic forms that are at a prelinguistic level (Miles and Riggio, 1999).

Success in the development of communication skills for learners with multiple disabilities is, therefore, depending on various communication characteristics essentially related to the role of teachers in their interactions with learners. These characteristics are: a) the ability to consider learners with multiple disabilities as equal partners in interactions, (Miles and Riggio, 1999), b) the ability to read and interpret potential communicative signals (Sigafoos et al., 2000), c) the ability to respond contingently to learners behaviors (Siegel-Causey et al, 1988) and, d) the ability to provide access to meaningful experiences that will support communication development and learning (Miles and Riggio, 1999, McLetchie and Riggio, 2002, Cripe and Venn, 1997).

Communication competence

Communication competence, as "the ability to functionally communicate within the natural environment and to adequately meet daily communication needs" (Light, 1989) should be the main communication goal of programs related to developing communication. Such communicative competence goes beyond the improvement of adequate ways of expressing needs and wants. For individuals with disabilities, as for any other individual, communication should also be a means to a) develop social closeness, b) exchange information and, c) fulfill social etiquette routines (Light, 1997). Development of effective communication skills should then be included in educational plans that take into consideration these three areas as well as necessary strategies to meet these goals.

As pointed out by Jackson, (1993) acquisition of communicative behaviors should reflect, "a dynamic relationship between the way activities and events are perceived by the individual when interacting with the environment, and the way experience, including language experience is represented and retrieved from human memory" (Jackson, 1993, p.151). Such ability to retrieve and use previously memorized experiences is important in the development of communication abilities. "Using is learning", as noted by Jackson (ibid,

p.152). This requires, in the case of learners with multiple disabilities, that adults and teachers in particular support representation and retrieving in order to help learners think about previous learning experiences that included communication and to encourage them to use previously used communication forms and functions in new contexts, therefore scaffolding for future learning that increases communicative competence.

Communication development and teaching

Approaches used in the past to improve communication skills in individuals with multiple disabilities derive from language development theories in which language is seen as a product of rule formation. According to Jackson (1993), these approaches aim at promoting " appropriate and complex linguistic skills rather than effective communication within particular contexts"(p.145).

Programs that are directed to the increase of language complexity, moving from nonverbal to verbal behavior, and from simple to complex verbal behaviors represent most of the intervention directions, often resulting in long term failures that do not meet the person's communicative needs. These models of service delivery are not consistent with best practice models that suggest the development of a repertoire of effective communication skills developed through interactions built-up in natural contexts (Downing, 1999).

The emphasis on communication development rather than language development in the education of learners with severe disabilities who do not speak stimulates, therefore, a necessary paradigm in the views that teachers in particular often have about language and communication. Changes occurred in the 70', shifting the focus from speech and language abilities to communication abilities (Bates, 1976), should be reflected in the way teachers view their communication with learners and should encourage them to use of other forms of communication apart from speech.

Little research has been done that deals with the communication needs of learners with multiple disabilities. This is partly due to the heterogeneity of the population, but also to the lack of belief that individuals with multiple disabilities can be taught and can develop. In fact, institutional models advocating that individuals with severe disabilities were to be provided with care and protection and not education were a rule in the beginning of the century. It is not until the 70' that individuals with severe disabilities begun to receive education, largely as a consequence of the principle of normalization defined by Wolfensberger (1972), which stated that person with disabilities had the right to live a life as close as possible to that of normal individuals. This principle of normalization included the right to have access to school and education.

Communication development should stand central in the educational process, as the necessary basis to convey information and allow learners to interact. Although some learners with multiple disabilities show speech abilities, too often these behaviors are not enough to fulfill communication needs. In many cases, language as a symbolic means of communication represents a long-term goal, not always achievable, therefore requiring more concrete ways of expression to allow learners to communicate efficiently.

For individuals with multiple disabilities the reduced number of environments they access and the reduced number of communicative partners in each environment represent an additional problem to the development of functional communication. The teachers' ability to maximize opportunities of communication will then depend on the ability to seize and select meaningful opportunities, including identifying particular partners, as well as the capacity to detect the best forms to communicate for an individual in a given environment.

In the absence of spoken or signed language as means of communication, experience needs to be represented by other forms, such as objects of reference, pictures, line drawings,

photos. The degree of symbolization of these forms will largely depend on the learner's capacities, more than on the teacher's ability to use a specific form.

Granlund et al. (1995) pointed out the need to develop research on the "form, content and outcome" of training of teachers for communication intervention with individuals with profound disabilities. Only if teachers have knowledge and practice in working with communication at pre-symbolic levels will learners with multiple disabilities have their communication needs met.

The next chapter describes methodologies used to analyze the communicative characteristics of interactions between non-speaking multiply disabled children and their non-trained teachers.

METHODOLOGIES

This chapter provides a rationale for the methodologies used to answer the main research questions of this study:

-What are the communication patterns between non-speaking multiply disabled children and their teachers in the school context?

- How does intervention impact on the communicative patterns of teachers and non-peaking multiply disabled children?

Analysis of the theory concerning communication with children with multiple disabilities advanced a set of secondary questions to be answered in order to respond comprehensively to the main research questions. These questions are:

1. What are the communicative forms and functions used by children?
2. What are the communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
5. Why do teachers miss opportunities for communication?
6. What are teachers' expectations about communication with these children?
7. Do teachers miss fewer opportunities for communication after an intervention procedure?
8. Does intervention improve teacher's interactions with children with multiple disabilities?

Research Design

This study uses a case study design (Yin, 1994; Stake, 1995) of two children with multiple disabilities and their teachers. The unit of analysis is the teacher/child dyad and the subject of analysis is the communicative interaction established inside the dyad during school time.

Case study is " an intensive, holistic description and analysis of a single entity, phenomenon or social unit" (Merriam, 1988, pg 16) which can be used to develop an understanding of the complexity of a particular case in a bounded context (Miles and Huberman, 1994).

The decision to use a case study design in this study relates to the type of research questions developed, which suggest the need to increase understanding of a particular phenomenon, i.e., the communication characteristics of interactions between children with multiple disabilities and their teachers. It also conforms to Yin's suggestions for the use of a case study model (Yin, 1994) which point out that such an approach is useful when there is a need to 1) describe real life context in which intervention occurs, 2) describe the intervention itself and, 3) explore those situations in which the intervention being evaluated has no clear set of outcomes.

Instruments

Children's characterization in this study used two instruments: the Callier Azusa Scale version G (Stillman, 1978) and the Boston Children's Hospital Communication Profile (s/d).

The Callier Azusa Scale assesses the overall development of deafblind and profoundly disabled children in the following areas: a) motor development, b) perceptive abilities, c) activities of daily living, d) cognition communication and language and e) socialization. The scale is intended to be used by teachers and values information collected from various sources such as parents or teacher aides.

The Communication Profile also values information from various sources. It allows for data collection on early communication through the description of: a) communicative functions, b) expressions of basic needs and, c) expressions of preferences. The Communication Profile includes information about specific behaviors used, places and

activities in which behaviors are expressed and frequency of occurrence. Information about communication was gathered through contacts with teachers and the mothers.

Additionally a Likert-type scale was used to assess results of the intervention procedure included in the study.

Likert (1932) developed a method to collect opinions of respondents towards specific issues. This method consists of asking people to express their level of agreement or disagreement concerning written statements.

Traditionally Likert scales were composed by a variable number of statements and a set of five levels of agreement ranging from "totally disagree" to "totally agree" level. Variations of the original method have been developed that involve decisions on the following issues: 1) number of items used, 2) labels used for items and 3) presence of absence of a neutral point, 4) type of scale and consequent data analysis. This study uses a nine item five point Likert-type scale.

Data Gathering Methodologies

Data in this study was collected through the use of participant observations, systematic observations and interviews.

Participant observations

Spradley (1980) describes participant observation as a means to "observe the activities of people, the physical characteristics of the social situation and what it feels like to be part of the scene." In participant observation data collection is primarily done through active listening and watching. The observer is, in this case, the main instrument by which data is collected. Observers are expected to conduct intensive, long-term observation in order to collect information that supports the description and interpretation of people's actions in particular places (Jorgensen, 1989).

Participant observation helps researchers get an insight into social interactions that happen in natural settings. In this study this was considered an advantage since observed cases were learners with multiple disabilities, who might easily be affected by the disruption of their usual patterns leading to reduction and distortion of their natural responses (Linder, 1993).

Spradley (1980) defines a continuum of involvement in observations with five degrees of participation that range from non participation to complete participation, and that includes levels of 1) non participant, 2) passive, 3) moderate, 4) active and 5) complete participation. The degree of participation depends both on the nature of the events being observed and the level of involvement that the observer, although not actively involved, decides to have. This continuum is questioned by Dewalt et al. (1998) who believe that the degree of involvement of the observer in the observed situations should be consider separately form the level of participation.

Bernard (1995) refers to participation using just two opposite poles: 1) directive reactive observation, when observed persons know they are being observed, and the observer is involved in the observation, and 2) unobtrusive non reactive observation, in which the observed persons do not know they are actually being observed.

Glesne (1999) defines participant observation at three levels: 1) observer, when the observer does not take part in the activities observed, 2) participant as observer, when the observer interacts in the observed situation and 3) full participant when the observer is part of the observed situation. In this study the role of observer was chosen as the methodological option to carry out observations.

Systematic Observation

Systematic observation is a methodological option for obtaining accurate records of behaviors. Johnson and Sacket (1998) argue that direct systematic observation supports the

construction of reliable accounts of observed activities or behaviors. Researchers choose systematic observation when they want to include in their studies rigorous observation that allows for data quantification.

Spradley (1979) suggests a similar type of observation that he calls *focused observation*, which narrows the scope of what observers look for, allowing them to concentrate on specific domains.

This type of observation answers the need for an in-depth analysis and counting in some of the domains that emerge during participant observations.

The use of systematic observation requires the observer to set up a structure that orients observation. Johnson and Sackett (1998) suggest that the observer should concentrate in three kinds of variables: actions, actors and settings. Using these variables, a structure for observation needs to be set, taking into account: 1) the type or types of behaviors to observe, 2) the amount of time spent with observation, 3) who will be the focus of observation, 4) where will the observation take place, and 5) which activities will be observed. The same authors stress the importance of these sampling strategies as a necessary compromise between the impossibility of the observer to observe everything, and the need to observe enough to allow accurate descriptions.

Accurate recording of behaviors can be achieved through the use of technology, such as videotapes (Walsh, 1998). Ting (1998) points out the need for videotaping of classrooms to be as non-intrusive as possible and suggests a technique for videotaping that fixes the camera and does not use the viewer, therefore making the process more friendly to teachers.

Although the use of videotapes is not in itself a secure measure to guarantee accuracy, since videotapes do not caption all aspects involved in an activity and transcripts of a videotapes do not totally depict the reality observed, videotapes provide additional information that can be used to verify observations and make data analysis more precise and

therefore easier to retrieve, quantify and analyze. Systematic observations in this study were recorded in videotape using a non-intrusive thecnique and complemented with field notes

Interviews

Interviews are defined by Maccoby and Maccoby (1954, pp 499) as "face to face verbal exchanges in which one person, the interviewer, attempts to elicit information or expressions of opinions or belief from another person and persons".

The use of interviews has become a widely spread method for the collection of data on individuals' opinions, interpretations and subjective experiences. By interviewing subjects, researchers attempt to establish connections between individuals and the contexts in which they are situated and acting. They provide a way for interviewers to get deeper insights and extend their knowledge on the subject they are researching.

As a means to collect information interviews require the interviewer to use appropriate techniques. Denzin, (1978) describes three types of interviews: standardized, semi-structured and unstructured interviews.

In *standardized interviews* questions are expected to be nearly identical to all interviewees. This type of interview is mostly used when there is a need to collect sets of information that are the same for all respondents.

Semi-structured interviews requires that a guide be followed, which includes the questions and topics to be addressed in the interview. Still, some level of freedom is accepted in the way questions are raised and topics are covered.

Unstructured interviews represent little or no control over the informant. Although interviewers have a plan in their mind, interview flows with no specific plan or order.

This study includes data gathered through the use of semi-structured interviews.

Data Analysis Methods

Thematic analysis

Thematic analysis (Skinner, Rodriguez & Bailey, 1999, Aronson 1994) refers to the process of extracting meaning from data with the purpose of interpreting and describing it. Strauss and Cobin also describe this type of analysis calling it "open coding" (Strauss and Cobin, 1990).

Meanings are categorized under themes and categories, which provide a basis for description. The process of finding categories requires an in-depth analysis of the text together with a continuous inter relation with theory. Categories are "groups of words with similar meaning or connotation" (Weber, 1990, pg 37) and should be "mutually exclusive and exhaustive" (GA Office, 1996, pp 20).

Important to thematic analysis is the construction of valid arguments for choosing themes (Aronson 1994), which will support the established relation between data and themes devised. This relationship strengthens and supports the meaning of the descriptions the researcher writes after the analysis is finished. Thematic analysis in this study was used to analyze data from participant observations and interviews.

Content analysis

Content analysis is a systematic procedure used to describe the contents of communications (Merriam, 1988). The process of content analysis is essentially a coding process (Miles and Huberman, 1994). The researcher determines initial units of meaning, which are categorized into larger units. These larger units can then be coded and used to compare, describe and count data.

According to Krippendorph (1980), "much content analysis research is motivated by the search for techniques to infer from symbolic data what would be either too costly, no longer possible, or too obtrusive by the use of other techniques" (p.51). Skinner, Rodriguez

and Bailey (1999) stress the advantages of content analysis for systematic coding of qualitative data and its transformation into numerical data.

A major question in content analysis is the validity of the coding system (Bernard,1995) requiring agreement to be defined among different coders before the coding process is complete. This process will assist the development of intercoder reliability, which strengthens the validity of the coding system used. Analysis of systematic observations in this study used content analysis methodology.

Matrices

Matrices are explained by Miles and Huberman (1994, pg239) as ways to display data involving "the crossing of two or more main dimensions or variables [...] to see how they interact". Matrices represent an effective way to reduce long amounts of non-organized data into easy-to-read visual displays. These displays are in themselves levels of analysis, representing researchers' progress in the process of extracting information from data.

Choosing matrices to display information in a systematic way helps clarify data analysis results, and supports the drawing of conclusions. It is also an effective way to present results. Matrices were used in this study to analyze data from participant observation, systematic observation and interviews.

Descriptive analysis and descriptive statistics

Data from systematic observations and the Likert-type scale were explored through descriptive analysis and descriptive statistics. Percentages were used to describe results of systematic observations. Modes were calculated to describe results of the Likert-type scale, and the Kolmogorov-Smirnov goodness of fit test was used to analyze agreement among judges' responses.

The Kolmogorov-Smirnov D test (Siegel, 1956) is a goodness-of-fit test, which tests whether a given distribution is not significantly different from a hypothesized one (e.g., on

the basis of the assumption of a normal distribution). The D value is the largest absolute difference between the cumulative observed proportion and the cumulative proportion expected on the basis of the hypothesized distribution. The obtained D value is compared with a table of critical values of D in the Kolmogorov-Smirnov One-Sample Test, for a given sample size. If the obtained D value is less than the critical value, the researcher fails to reject the null hypothesis that the distribution of the criterion variable is not different from the hypothesized distribution.

Design of the Intervention Program

The rationale for designing the intervention program sets its basis in the assumption that teachers' evolution, as professionals should start with reflections over their own practice (Zeichner, 1993). Teachers in such an approach are viewed as reflective professionals whose activity goes beyond application of pre fabricated programs (Schön, 1983) and makes them active agents in the definition of educational goals as well as in the selection of means to obtain such goals. In this reflective context the use of videotapes supports reflection over "directly observed data" (Schön, 1992, pg 90), which allows for detailed description of behaviors to be analyzed. Also, teachers' detection of their own needs is said to be fundamental in the designing of in-service training programs (Burden and Wallace, 1983; Blackmore, 1991), as it involves teachers in their own training process from the beginning. Therefore, analysis of videotaped interactions between teacher and learners, and development of programs responding to teachers' expressed needs were chosen as strategies for intervention.

Issues of Validity

Validity in this study cannot be single measured. Data derives from various sources and there is not one set of results that can be used to quantitatively analyze in order to respond to validity criteria.

Merriam (1988) points out to the need to define criteria for validation regardless of the type of research. As a way to compromise between traditional concepts of validation and the nature of qualitative data Lincoln and Guba (1985) provide for terms such as *truth-value*, *transferability* and *consistency* to be used in the definition of validity of qualitative studies.

Following suggestions from Miles and Huberman (1994), the following concepts were used to guarantee validity of the study: 1) confirmability/objectivity (are conclusions depending on data and not on the inquirer), 2) dependability/reliability (consistency of the process), 3) credibility/internal validity (are findings credible to people studied and to readers), 4) transferability/external validity (can conclusions be used in other contexts).

Confirmability/objectivity

For reasons of confirmability, both raw data and generated data were retained and kept available. Generated data is included in appendices and a detailed description of methods, procedures of data analysis and criteria used is provided. Reflections on possible biases are included when necessary.

Dependability/reliability

Methods used were supported by underlying theoretical assumptions and related to research questions. A description of each method was included. Inter-coder agreement was used to code learner's behaviors. Data source triangulation (Denzin, 1984) was granted through the use of several data sources that analyze the same phenomena. Comments and suggestions of professionals in the field of prelinguistic communication and qualitative research were taken into account in the final version of this dissertation.

Credibility/internal validity

Description of results was related to theoretical information and convergence of results across methods was pointed out. Questions arising from data analysis were also pointed out and additional data collected whenever needed in order to check questions (e.g.,

the decision to include a Likert-type scale derived from doubts concerning the results of intervention). Judges were used to assess the reliability of intervention results.

Transferability/external validity

"Thick descriptions" of observed phenomena were provided that help to understand findings. Possible use of results in similar settings was also described through the development of a set of implications for practice, aimed at supporting non-trained teachers develop their communicative interactions with learners with multiple disabilities.

The following chapter includes a description of methods used for data generation and data analysis.

METHODS

Mixed methods that included participant observation, systematic observation and interviewing were used to conduct an initial analysis aimed at: a) describing the communicative patterns between children and teachers and, b) supporting the development of an intervention plan to be carried out with the two teachers.

Methodologies for analysis of participant observations, systematic observations and interviews included thematic analysis, content analysis, matrix generation and descriptive analysis.

Methodologies for intervention included: a) discussions with teachers while watching their communication behaviors on videotape, b) assessment of teacher's communication needs in their interactions with children and c) development of a communication intervention plan.

Results from discussions with teachers led to an intervention program developed in cooperation with the teachers and aimed at answering their communicative needs expressed during the intervention session. The program was written by the researcher and given to the teachers together with written information concerning pre linguistic communication. Interactions were re-observed and observational data collected a month later.

Assessment of intervention was done through analysis of results of systematic observations and a Likert-type scale. Results of analysis of missed opportunities for communication in pre and post intervention sessions were compared. A group of judges observed four videotaped sessions for each case (three pre intervention sessions and one post intervention session) and rated it through the use of a Likert-type scale providing additional data that supported intervention assessment and helped describe interactions. Quantitative data collected was analyzed in order to assess possible changes in interactions after

intervention. Statistical significance for the Likert-type scale results was determined through the use of the Kolmogorov-Smirnov goodness of fit test.

Time boundary for this study was the school year of 1999/2000. The main reason why this project was conducted for only a school year was the need to maintain consistency in the teacher/child dyad and the fact that the rate of teacher turnover is very high, particularly in schools for children with multiple disabilities. In fact, it turned out that both teachers left their schools at the end of the school year.

Access to Information

Contacts with schools and obtainment of school and parents' permissions were accomplished between October and December 1999. Schools were formally contacted by the Department of Psychology of the University of Porto through a written letter that explained the goals of the study, assured confidentiality and asked permission for the researcher to access classrooms. In both cases, schools contacted the parents to obtain written permission for their children to be involved in the study. Teachers were individually asked for their willingness to participate in the research.

After permissions were obtained, meetings were conducted individually with each teacher to further explain the goals of the study and to detail the procedures to implement.

Case Selection

Ten special schools were contacted through phone calls to inquire if there were pupils with multiple disabilities in their caseload. The researcher visited two schools located in the Lisbon area that had identified potential cases. The visits were intended to select cases that met the following criteria:

1) Children should be over 5 years old,
2) Children should show no oral or sign language,

3) Children should present combinations of two or more handicaps and should have been diagnosed as multiply disabled,
4) Each case should pose different communication challenges,
5) Teachers should have no prior training in communication with children with multiple disabilities,
6) Teachers should agree and demonstrate interest in participating in the study.

The rationale for choosing teachers with no training in communication was based on the researcher's experience, which showed that most teachers working in classrooms with learners with multiple disabilities do not have training in special education. This suggested the need for a proposed outcome of this study, which is the development of suggestions to help teachers make communication decisions in their work with learners with multiple disabilities who are at a prelinguistic level of communication.

After observation and discussion with teachers, two children (one form each school) were selected for this research. By choosing two cases instead of just one, the researcher intended to increase the diversity of information concerning the subject of this study, i.e., communication between children with multiple disabilities and their non-trained teachers. One child will be named Anna and the other one Maria.

Anna is a ten-year-old child who is considered by the teacher to be a "non communicative child", and therefore met one of the criteria for case selection. She has combinations of motor, sensory and cognitive problems. Questions that arose during the first visit were: 1) why does the teacher say Anna does not communicate? 2) Does Anna show intentional communication behaviors? 3) How does Anna try to communicate?

Maria is also aged ten. She is a non-speaking learner with motor and severe visual impairments. Maria was chosen as a case study because the teacher, although recognizing Maria's interest in interaction, was unable to devise a system that could provide for her

communication needs, mainly due to Maria's vision and motor problems. Questions for this case were 1) how does Maria react to the use of concrete means of communication such as objects? Does Maria understand speech? How does Maria try to communicate?

In both cases although children did not talk, teachers and staff in school use speech to interact with them.

Case Description

Participants in this research are two non-speaking learners with multiple disabilities and their teachers. Instruments used to portray both children and teachers are mentioned below.

Children's characteristics

Description of children's characteristics uses results from: 1) The Callier-Azusa scale for deafblind and multiply disabled children, version G (Stillman, 1978) and, 2) The Communication Profile of the Communication Enhancement Center of Boston Children's Hospital. Results of the Scale and the Communication Profile for each case are in Appendix A. Descriptions also include information from interviews and participant observations.

Information collected included opinions of teachers, teacher aides, parents, speech language pathologists, occupational therapists and physiotherapists. Contacts with these professionals aimed at discussing children's performance in order to find agreement on the type of checking to be made.

Anna

Anna is a small ten-year old girl, who likes to sit quietly and enjoys playing with play dough. Her medical profile indicates that she has a chromosomal disease related to chromosome X.

Results of the Callier Azusa scale displayed in Appendix A indicate that Motor Development and Daily Living Skills are areas in which Anna shows her best performances.

In the area of Perceptive skills Anna shows good tactile skills that contrast positively with her hearing and vision abilities. Anna shows greater difficulties in the area of Cognition, Communication and Language, and in the area of Social Skills. Altogether Anna's performance is not homogeneous. She shows scattered skills in all areas and discrepancies between areas in which she shows better performance (e.g., motor skills) and areas in which she performs at lower levels (e.g., social skills).

The Communication Profile indicates that Anna's frequent communicative functions as interpreted by the teacher or the family, are requests (e.g., at home she gets a cup and waits for it to be filled), negations (e.g., does not initiate a desired movement). She expresses basic needs (e.g., go lay on the mat when she is tired), dislikes (e.g., turns away from an activity). She expresses object preferences (gets play dough form the shelf). It is not clear that she shows a communicative intent.

Maria

Maria is a ten-year-old girl who spends most of her time on a wheelchair. She likes music and people talking to her. She has spastic quadriplegia and retinopathy related to prematurity.

The results of the Callier Azusa Scale show that Maria's best performances are related to hearing abilities. Her motor and visual limitations generate massive difficulties that impact on all aspects of development and limitate her performances.

The results of the Communication Profile indicate that Maria is a communicative child that uses basic behaviors such as crying, smiling and general body moving to express different communicative functions such as requests and negations. She also expresses comments, basic needs and affect. People in the environment understand her preferences by interpreting her behaviors in specific contexts (e.g., they know she likes going out because she always smiles when taken out).

Teachers' characteristics

Teachers were asked to fill out: 1) a questionnaire asking about their views on issues related to teaching children with multiple disabilities, 2) a form with information pertaining to their experience as teachers and their options concerning areas to include in children's programs and, 3) a six point rating scale concerning their knowledge about communication. The questionnaire and forms used are presented in Appendix B.

Anna's teacher

Anna's teacher is preschool teacher who has worked for more that 15 years and has no training in special education. It is her first year working with learners with multiple disabilities. When asked to rank areas that should be considered in the development of educational plans for learners with multiple disabilities she ranks Communication as the first priority. Secondly she mentions Sensory-Motor Integration and she ranks Activities of Daily Living in third place. Asked to mention the activities she usually selects to work with children she mentions expressions, sensory motor activities communication and, socialization activities. She believes that communication is the biggest problem in her work with learners with multiple disabilities because of the absence of speech and favors oral language as the basis to help learners' learning process On a six point scale Anna's teacher rates her communicative competence at level three.

Anna's teacher would like to have training and more support from other staff in school. She also feels the need for adequate materials that support the development of appropriate activities.

Maria's teacher

Anna's teacher is preschool teacher who has worked for more that 15 years and has no training in special education. It is her first year working with learners with multiple disabilities. When asked to rank areas that should be considered in the development of

educational plans for learners with multiple disabilities she ranks Socialization as a fist priority, then Communication and Activities of Daily Living in the third place. On a six-point scale Maria's teacher rates her communicative skills at level three.

She prefers activities that promote social emotional bonding between teacher and child as a starting point for the development of other activities such as expressions, sensory development, story telling, music and singing, and outdoor activities. The absence of adequate training is mentioned as the biggest difficulty that she experiences. As a way to overcome such difficulties she opts to continuously reflect on her practice, look for information and experiment new ways of dealing with children.

Settings

Schools

Research was conducted in two special schools for learners with cognitive challenge and multiple disabilities. Both are semiprivate schools resulting from parent initiatives situated in the Lisbon area. General information about the schools was collected from informal talks with coordination staff. No detailed information was collected about schools; such data was not intended to be used in this study.

Classrooms

Anna is enrolled in a classroom of six learners aged seven to ten with different handicapping conditions, all ambulatory except one. The classroom has a teacher aide who has been working in the school for 20 years.

Maria attends a classroom of five learners with multiple disabilities and severe motor impairments. Children's age range from ten to 14 years of age. Two learners walk independently. The teacher is a pre-school teacher with no experience in special education. The classroom has two teacher aides. One teacher aide has been working in the school for four years and the other one is new in school.

As the goal of this study is to analyze teacher/child dyads, there was not a highly detailed observation and data collection related to the classrooms. Still, a description of the environment and a map of the classroom are presented in the next chapter as a way to help understand settings in which interactions took place.

Activities

The researcher observed classroom activities between January and July 2000. Observed activities were part of the classroom schedule. A total of ten activities were observed in Anna's case and a total of 11 activities were observed in Maria's case. Eight activities were chosen for analysis in each case. Four of the eight activities were also videotaped for systematic observation.

Although the main goal was to observe teacher/child interactions, the researcher realized that most of the time children spent in school was either devoted to activities such as occupational therapy and speech and language therapy, or included the teacher aides. Therefore it was decided to include some of these activities in the observations and collect information about children's communicative performance with other adults.

The videotaped observations registered teacher/child interactions only, and were aimed at obtaining detailed data related to the characteristics of interactions in order to make possible the assessment of the intervention process.

In Anna's case the non videotaped activities were 1) ripping and gluing paper, 2) peg board playing, 3) playing with wooden forms and buttons with the occupational therapist, and 4) playing with balloons and with a tape recorder with the speech and language pathologist The videotaped activities were: 1) playing with foam, 2) washing hands, 3) paper gluing and, 4) music.

For Maria the non-videotaped activities were: 1) cause and effect activities, such as using a switch to activate a toy, 2) leisure time (Maria is playing with a tape recorder), 3)

relaxing (laying on the mat and playing with the teacher aide), and 4) exploring a touch book with the teacher. The videotaped activities were 1) two sessions in the Snoozelan room[4], 2) one foam activity in a group and, 3) another foam activity in which teacher and child were in a one-on-one interaction.

Activities were selected in both cases according to the child's schedule, trying to make observations as representative as possible of the activities each child normally goes through in school. The initial intention was to include observations of functional activities, such as meal times. Still, having realized that these activities were carried out with no communication (i.e. Anna eats by herself), it was decided to leave out these activities.

Data Collection Methods

Data collected refers to the school year of 1999/ 2000. Several data collection and data analysis methods were used. Table 1 summarizes data collection methods used to answer research questions.

Table 1-Methodologies Used to Answer Research Questions

	Participant observation	Systematic observation	Interviews	Likert-type Scale
Question #1 What communicative forms and functions used by children?	X	X	X	
Question #2 What communicative forms and functions used by teachers?	X	X	X	
Question #3 How do teachers and learners engage in turn taking activities?	X	X		X
Question #4 What communication behaviors do teachers respond to?	X	X		
Question #5 Why do teachers miss opportunities for communication?	X	X	X	X
Question #6 What are teachers' expectations about communication with these children?	X		X	
Question #7 Do teachers miss fewer opportunities for communication after an intervention procedure?	X	X	X	X
Question #8 Does intervention improve teacher's interactions with children with multiple disabilities?		X	X	X

[4] Snoozelan room - multisensory stimulation room, with hearing, vision, tactile and movement stimuli

Data Analysis Methods

Data generated from participant observations, systematic observations, interviews and the Likert-type scale were analyzed through the use of different methods of data analysis. Data analysis included: 1) thematic analysis, 2) content analysis, 3) matrix generation and, 4) descriptive statistics. Table 2 reports on the types of data analysis used for each collected product.

Table 2 - Data Analysis According to Data Collections Methods

Methodology	Resulting products	Analyses
Participant observations	Field notes Charts	Thematic analysis
Systematic observation:	Video tapes Transcripts	Matrices Content analysis Descriptive Statistics
Interviews	Audiotapes Transcripts	Thematic analysis
Likert-type scale	Scale rating forms	Descriptive analysis/ descriptive statistics

Procedures

This section details the description of procedures for data collection and data analysis, as well as the procedure for the intervention program. Each method will be described separately.

Before starting formal observations two days were spent in each school contacting teachers and visiting the classrooms. These two visits were aimed at making the researcher's stay as comfortable as possible for the teachers. During these two days, the researcher participated in school activities, helping teachers when needed. This procedure continued throughout the whole observation period, whenever the researcher was not formally involved in observations. This methodology of participant observation led to gathering data that

helped understand some of the issues related to the communication process between teachers and children.

Participant observation

Participant observations were carried out between January and March 2000. Collected data helps answer the following research questions:

1. What communicative forms and functions used by children?
2. What communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
5. Why do teachers miss opportunities for communication?
6. What are teachers' expectations about communication with these children?

Data collection

The nature of the presented research which intended to analyze how teachers and children communicate required the observer to be as non intrusive as possible. The researcher was aware of the fact that any intervention from her side would produce changes in the communication process. This was the main reason why the role of observer was chosen as the methodological choice for classroom observation.

Although researcher's former involvement in the field made it difficult not to get involved in the situation, observations were conducted with no direct intervention in the observed interactions. Still, it should be noted that situations were continuously compared with an interpretive lens provided by former experience that influenced interpretation.

Apart from the running accounts of what happened three kinds of field notes were used. Personal reflections such as reminders of details to observe or attention to particular events constituted *methodological notes* (ex*:* "Check with the Speech Language Pathologist about Anna's speech comprehension", or "The teacher says Anna is more communicative during horseback riding - observe on Friday"). Thoughts, questions and reflections during observation were categorized as observer *comments* (ex: "The school has a nice attitude

towards learners. Still, they do not expect any achievement from them. They simply take care of them. Just aim at making them comfortable").

Finally, *analytical notes* were also written. These included interpretations and inferences based on what was observed and the literature in the area of communication, education of children with multiple disabilities and education in general. (e.g., "This activity is defined in the schedule as a "*Communication*" activity although it only consists of cause-effect activities. During the session children play with switch-activated toys. Maria should probably be using her AAC device for functional communication reasons, not just to activate music").

Observations were carried out in the classroom or in specific activity rooms such as the Snoozelan room or the speech and language therapy room. Attention was directed to the interactions between learner and adult in a given activity.

Adult/child interactions during activities were observed with a focus on the communication process. Descriptions of potentially communicative behaviors as well as partner responses, context descriptions and observer's comments were included in the field notes.

Some observations involved teacher aides, speech and language therapists and occupational therapists. The goal of these observations was to collect additional data on the children's communicative abilities and explore partners' communication influence in children's communicative processes.

Observations were conducted with as little influence as possible on the communicative process. This was easy as far as learners were concerned. Anna did not show any particular interest in the observer. Maria due to her visual impairments had a reduced awareness of the observer's presence.

It had been made clear to teachers that observations were directed towards children's communication. There was no particular mention of an interest in the teacher as a partner in communication. Still, teachers were aware of the fact that they were being observed, which may have caused them to be less spontaneous in the beginning. Aware of that possibility, a decision was made to start videotaping activities only after trust and confidence were already established between researcher and teacher.

Each observation lasted for the time an activity ran. The researcher wanted to analyze how teachers set the activities, how much involvement children had in the process of setting up the activity, what clues teachers gave to children to help them anticipate the activity, and also what clues they gave children to inform them about the end of the activity.

Observations averaged about 20 minutes. Field notes were kept in a notebook and included an initial description of the activity, the partner, place, time of the day, duration, number of children and adults in the room, and position of adult relative to the child. Field notes from observations were expanded and typed into a Microsoft Word 2000 text processor. This was done soon after the notes were taken to guarantee maximum accuracy and provide for as much detail as possible.

Data analysis

Thematic analysis was used to analyze field notes collected during participant observations. Emergent themes in this analysis resulted from: 1) the main subject of research, 2) theoretical assumptions and, 3) researcher's former practice working with children with multiple disabilities. Table 3 illustrates the sequence of actions undertaken in thematic analysis. Initial field notes were read and helped develop analytical notes, which were grouped and converted into a matrix creating a visual summary of performed analysis (see Table 4).

Table 3 - Thematic Analysis Process

Level 1	Level 2	Level 3	Level 4
- Observation accounts - Field Notes - Review field notes - Develop analytical notes	- Display notes in matrix according to each observation - Analyze notes - Look for patterns - Categorize notes	- Display notes in matrix according to categories - Analyze categories/ look for explanations - Relate to literature	- Review categories - Develop possible explanations - Relate again to literature - Draw conclusions - Describe

This matrix helped identify patterns and recurrent themes that were grouped together. Grouping of themes was facilitated by the use of color codes. (See appendix C)

Table 4 - Thematic Analysis - Example of a Matrix of Analytical Notes

Ripping paper	Playing with forms and buttons	Peg board playing	Playing with balloons and a tale recorder
Not interested in the activity. Does she understand what she is expected to do?	Does not respond to speech	She likes to have a piece of play dough in her hand. What does play dough do' some sort of sensory stimulation? Sensory integration?	
Takes materials into her mouth Why does she still need to use her mouth to explore?	She does not like that play dough is taken from her hands Does she need that kind of tactile support? Sensory integration?	Does it make sense to take play dough from her hands? Or the opposite?	Explores materials with her mouth
Why is she tapping on the table with a rhythmical pattern?	Her responses are very slow. She seems to need more time than average to perform activities	Not interested in the activity. Does she understand what she is supposed to do?	How do her sensory channels work?
Little one on one interaction with children	Why does she tap on the table?	Adult moves away from her in the middle of the activity. Adults move around constantly	Does she have limited field vision? Her eye shape might suggest that.
Intervention is not consistent. People come	She seems to react to tactile stimulation	Does she understand what to do to accomplish	No reaction to sound

Ripping paper	Playing with forms and buttons	Peg board playing	Playing with balloons and a tale recorder
in and out of the classroom leaving her alone		an activity? She did not have any information to support that.	
Does she understand what she is expected to do?	Adults do not provide time enough for her to answer. Still she often takes quite sometime to respond. She responds only if there are objects or signs that accompany speech	The teacher aide mentions that she likes materials such as play dough and foam.	Responds to sound after having seen the tale recorder likes to feel the vibration of the tape recorder
Responds to some one coming in by smiling	She keeps tapping on the table. Does she need a rhythmical structure?	She does not perform the activity. Is it because she does not want to do it? Or because she does not know what to do?	Does she react to sound or to the vibration?
Is she looking for rhythm?	Does she need rhythm to organize herself?	Why does she throw materials on the floor in such a rhythmical way?	Her reactions to tactile information seem to be more explicit that to other sensory input

Through the use of another matrix (Table 5) these themes were categorized and again analyzed as a way to find possible explanations for patterns found. Once possible explanations were found, these explanations were related with available literature in the field and data was, again, analyzed. This process was kept going back and forth, between data and analysis, trying to confirm our previous decisions and eventually find more information that was worth being considered. Analysis was done through a methodical thinking process during which there was a constant process of inter relating research questions, literature, previous experience and observed data. Matrix displayed in Table 5 was used to facilitate and support data description and the emergence of themes used to describe data. Appendix C includes an example of a sequence of an analytical process.

Table 5 - Thematic Analysis- Example of a Matrix of Categorizations

Compliance	Adult's role	Interested in rhythmical activity	Delayed responses	Response to speech	Sensory stimulation
Not interested in the activity. Does she understand what she is supposed to do?	No one on one work with children	Why does she tap on the table	Very slow in her answers. Does she need more time to perform activities?	No response to speech alone	She takes things to her mouth Does she need to use her mouth to explore?
Does she understand what she is asked to do?	Intervention is inconsistent. Adults come in and out of the classroom	She looks for rhythm	She is not given time enough to respond. When she responds, it is always after some time after having been given a directive, and only if the directive includes an object or gesture	No response to speech alone	She does not like to have play dough taken away from her. Does she need that kind of sensory input?
Does she know what she needs to do?	People come in and out of the classroom. Anna does not know what is happening.	When she throws things on the floor may be she finds a structure. She is consistent, going on until all papers are on the floor		No response to speech alone	She seems to respond better to tactile stimulation
Does she understand the goals of the activity?	Adults move in and out.	She taps on the table. She gets some rhythm from that		Anna is given a lot of verbal information that she does not understand	She likes to have a piece of play dough in her hand. What does she get from that? Sensory integration?
She does not understand what she is doing	Anna is left alone	Rhythmical movements. Is she looking for a structure?		Responds to gestures	Is it necessary to take play dough from her hand in order for her to comply? Or could it be the opposite?

Systematic observation

Systematic observations were carried out between March and July 2000. Collected data helped answer the following research questions:

1. What are the communicative forms and functions used by children?
2. What are the communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
5. Why do teachers miss opportunities for communication?
7. Do teachers miss fewer opportunities for communication after an intervention procedure?
8. Does intervention improve teacher's interactions with children with multiple disabilities?

Data collection

Systematic observations of teacher/ child interactions were carried out through the use of videotapes. Videotapes proved to be particularly important as the performed analysis dealt with interactions supported essentially by nonverbal behaviors, particularly in children's case. This would have been difficult to capture through participant observation alone.

Four activities were videotaped for each child. In each case one videotape was carried out after the intervention process as a way to gather data for intervention assessment.

The decision to videotape observations was supported by the following reasons: 1) the researcher wanted to get accurate information on the kind of behaviors teachers and children displayed, 2) videotapes allowed for systematic coding and description of observed behaviors, which helped observe turn taking and quantify turns and behaviors: 3) videotapes

provided a convenient way to review behaviors that helped refine descriptions, and 4) videotaped observations provided additional data that ensured data triangulation.

The video system used was a portable nonprofessional VHS compact camera. Forty-five-minute cassettes were used to guarantee that each activity would be totally taped on just one cassette, therefore making the reviewing process easier.

The camera was focused on the child or on the teacher/child dyad. As displacements were very occasional, a fixed camera was used to make videotaping as unnoticeable as possible thus allowing the researcher to videotape without having to look through the viewer. This eventually made the videotaping process less intrusive.

Field notes of the videotaped observations were also taken. Videotape cannot always catch the emotive tenor of the participants or the analytical comments of the observant. These notes reflected the researcher's observations and theoretical questions throughout the activity.

Videos were transcribed and time coded. Time coding was used for two reasons. First it would make possible the location of a specific behavior whenever there was a need to review it. Second, it would facilitate time counts in case an analysis based on time parameters was to be performed.

Data analysis

Content analysis and basic counting of behaviors and turns were used as methodologies to analyze systematic observations.

Videotape analysis covered, 1) initiations of both teacher and child, 2) turn taking interactions, 3) communication forms used by teacher and child, 4) communication functions used by teacher and child, 5) the child's behavior forms that were more often responded to by the teacher and, 6) missed opportunities for communication. Item number six (missed opportunities for communication) was used to assess pre and post intervention sessions.

Before starting video analysis, a list of criteria was set up to define a) what is a turn, b) what is an initiation, c) what is a communicative behavior, d) what is a response and, e) how should forms be described. These criteria were discussed with a specialist in non-verbal communication and are displayed in Table 6.

Table 6 - Criteria for Behavior Analysis

Turn - a turn consists of an initiation (even if non intentional in children's case) and a response. When there is no response turns are not counted, unless a non-response is clearly identified as a communicative response.
Teacher's initiation - any behaviors direct towards the child or the group
Teacher's response - any behavior related to the child's behavior in time or content
Child's initiation - any behavior exhibited by the child (considering that any behavior has potential for communication)
Child's response - any behavior that follows and is related to the teachers initiation in time or content (non responses are counted if there is indication that the child understood the teacher's initiation)
Contingent behavior - any behavior that relates to an initiation in time or content
Teacher's verbal behaviors- analyzed at two levels: behaviors that happen together with other communication forms and behaviors that are only verbal
Children's behaviors -all children's behaviors are considered as potentially communicative
A child's delayed response is always considered a response
Children's behaviors that end a turn or a series of turns are not considered non-responded behaviors
Two behaviors in sequence (e g., picks up foam and rubs it in-between her hands) count as one behavior
M*ovements occurring together* are counted as only one behavior (e.g., smiling and moving one arm)

To facilitate video analysis, an initial matrix was devised in which behaviors of both teacher and child were displayed sequentially in separate columns, side by side. This facilitated detecting turns within the interactions (Table 7).

Matrix in Table 7 supported analysis of the 1) number of turns in each activity; 2) number of child initiations, 3) number of teacher initiations, 4) number of behaviors that teacher did not respond to, and 5) number of turns for each initiation.

Arrows were used to indicate turns and initiations. Each arrow followed a direction that started in the behavior initiating interaction and ended in the behavior responding to the initiation. A sequence of arrows indicates that turns went on.

Table 7 - Matrix of Interactions' Analysis

Comments	Adult	Child	Comments
		M starts moving her body making the waterbed bounce	Intentional behavior. Is she asking for more movement?
Friendly intonation, the teacher is playing with Maria	Teacher (laughing) No! No! No!		
		M keeps moving her body, making the waterbed bounce	
	No! No more excitement!		
		M increases her movements. She uses arms and legs to move the waterbed. She vocalizes and smiles	M seems to understand that this is a playful situation
Tries to calm her down?	Teacher takes Maria's hands		
		M keeps moving	
Playful intonation	"No! No! It does not work! I am not going to do it again! You do it yourself if you want!		M seems to understand

This initial analysis did not include the communication forms that were responded to by teachers. Analysis counted the number of behaviors that children displayed which were responded to by the teacher, with the underlying assumption that all behaviors have a potential for communication as long as they are seized and responded to by a partner.

The second analysis looked at behaviors forms and functions of both child and teacher. The analysis was again done through the use of matrices in which noticed behaviors were listed and its morphology described. Teacher's behaviors were also categorized in terms of possible function as most of them were verbal or had at least had verbal component.

Analysis of children' behaviors included description of possible functions expressed. Listing and counting of children's communicative functions was not performed as these functions depend essentially on the context and on interactions established between partners due to the lack of formal language. Nevertheless, suggestions of possible functions for some of the expressed behaviors were pointed out in the description as examples of the sort of interpretations that teachers could make, and by no means as a way to define which functions children were using.

Two matrices were used per activity, one describing child's behaviors and another describing teacher's behaviors. The matrix used to analyze children's forms and functions included a column in which the response of the adult, if any, was checked. The goal was to count behaviors that were not responded to by the teacher, and to describe behavior forms that teachers responded to. Tables 8 and 9 set up examples of matrices used.

Table 8 - Example of Matrix of Learner's Behaviors

Behavior description	Type of behavior	Code	Function	Adult's answer
M starts moving with strong movements making sounds at the same time Ahhhhhhh	Motor Vocal	MC VOC	Requesting interaction?	yes
M restarts the movement, she makes the waterbed bounce.	Motor	MC		yes
M keeps moving.	Motor	MC		Yes
M stops movement		PM		
M makes a sound	Vocal	VOC	Requesting attention?	Yes
M starts moving again	Motor	MC	Requesting more movement?	Yes
M keeps moving. She makes a sound Ah…..	Motor+vocal	MC VOC		End of turn

Data displayed in matrices were also used to perform a percentage analysis of the forms displayed by both children and teachers in each session as well as to count the amount of behaviors that teachers missed as communication opportunities in each session. The counting of missed opportunities served as a basis for intervention assessment.

Table 9 - Example of Matrix of Teacher's Behaviors

Behavior description	Type of behavior	Code	Possible function	Code	Comments
Teacher sings and claps hands at the same time. She keeps visual contact with Anna.	Verbal + motor/ rhythm	V+M +R	Provide information Perform a routine	INF	
The teacher taps on the table and sings. Then she moves her hands according to the music. (puts her hands around the mouth)	Verbal + motor/rhytm	V+M +R	Provide information Perform a routine	INF	

A code list was devised for each case. In Table 10 examples of these codes are presented. The list of behavior codes for each case is in Appendix D.

Table 10 - Examples from a Code List

Category	Code name	Code	Behavior description	Example
Action	Action over own body	AcC	Movements that seem to have a goal and are referred to own body	Washing mouth
	Action on objects	AcO	Movements using an object with an aim (different from material manipulation which movements do not seem to have a goal)	Gluing paper
	Action on people	AcP	Movements directed to somebody either an adult or a peer	Puts her head on teacher's arm

Analysis involved a process of moving back and forth, from data to matrices and back, as a way to extract as much information as possible from data generated. This required several re-observations of video sessions and continuous readjusting of data results.

Inter-rater reliability was performed through the use of external observation. The researcher coded one observation of each child, and then designed a coding system. The coding system was given to an external observer and codes were discussed between the two observers. The external observer attempted to code the same observations using the code system. In Anna's case, out of the 55 coded behaviors, the external observer agreed on 40 codes and objected on six. This resulted in 89% of inter rater reliability. Suggestions made by the external observer were incorporated in the coding system.

Coding of Maria's observation raised several questions, as the initial agreement over 40 behaviors was on 24 codes only, with a percentage of 60% of agreement. Researcher and observer discussed the coding system, reviewed the videotape and agreed on creating two

new codes. The two observers again coded the videotape individually and the second counting resulted in an agreement of 85%.

In order to accurately analyze Maria's behaviors, and because Maria has severe neuro-motor impairment, videotapes of Maria's sessions were discussed with a specialist in communication with children with cerebral palsy. The goal was to determine implications of non-voluntary movements in Maria's behavior and sort out which behaviors could be considered as voluntary and therefore potentially communicative.

Likert-type scale

To obtain additional information on the pre and post intervention differences observed in systematic observations a Likert-type scale was used.

Results of systematic observations, namely the number of behaviors that teachers did not respond to in pre and post intervention sessions, directed the researcher into concluding that the intervention procedure carried out changed the way teachers and children interact. Still, discussions of videotaped observations with two professionals working with children with multiple disabilities and trained in the area of prelinguistic communication raised some questions concerning the impact of intervention on teacher child interactions that required additional explanation and raised the need for further assessment. Questions raised were the following: 1) Does the activity facilitate interactions? 2) Does the teacher incorporate turn taking into the activity? 3) Does the child initiate communication? 4) Does the teacher respond to child's initiations? 5) Is the activity enjoyable and motivating for the child? 6) Does the teacher interpret child's behavior as communicative? 7) Does the teacher pace interaction according to the child's needs? 8) Does the teacher miss opportunities for interaction and 9) Does the teacher develop interactions that provide opportunities for learning?

In order to answer those questions two groups of raters were asked to express their opinions on a nine item five point Likert-type scale. Scale's results were collected in May 2001. Results of the scale helped answer questions number three (how do teachers and learners engage in turn taking activities), five (why do teachers miss opportunities for communication), seven (do teachers miss fewer opportunities for communication after an intervention procedure) and eight (does intervention improve teacher's interactions with children with multiple disabilities).

The scale's rating ranges from Strongly Disagree (1) to Strongly Agree (5). Statements used in the scale relate to the questions raised during discussions of videotapes concerning teacher/child interactions. Table 11 displays the scale used for assessment of teacher child interactions.

The scale was piloted with a group of five teachers trained in education of children with special needs. The resulting version was used with two groups of judges: 22 judges for Maria's sessions and 26 for Anna's sessions.

Scale's nine statements aimed at informing about 1) potential for communication in the activity (item FDI - *activity facilitates interaction*, item AAM - *enjoyable and motivating activity*), 2) children's communicative initiations (item CIC - *child initiates communication*), 3) teacher's responses to child's initiations (item RIC - *teacher responds to child's initiations*, item ICC - *teacher interprets child's behavior as communicative*, item POI - *teacher misses opportunities for interaction*) and, 4) teacher's ability to include communicative and learning opportunities in the activity (item IAT - *teacher includes turn taking into the activity*, item RRF - *teacher paces interaction according to the child's needs,* item IPA - *interactions provides opportunities for learning*).

These areas are considered as important areas for the development of communication with learners who are at a prelinguistic level of communication. Statements were selected

and discussed with a professional responsible for training in prelinguistic communication. Items were displayed in random sequence.

Twenty-six raters were asked to answer questions on the Likert-type scale. The 26 judges were 21 speech and language pathologists in postgraduate training, all with training in analysis of non-symbolic communication, and five psychologists working at the Department of Psychology from University of Porto, trained in video observation. Twenty-six raters viewed four videotapes of Anna, one of which was a post intervention session, and 22 raters (four of the group could not be available for the second session) viewed four videotapes on Maria. Again, in Maria's case there was a video with a post intervention session.

In order to provide for a common understanding of the scale, judges were also provided with information about the meaning of *turn-taking* as a way to alternate behaviors giving children opportunities for interaction, *pacing behavior* as a way to synchronize their behaviors with children's behaviors respecting their rhythm, and *learning opportunities* as the way teacher goes beyond basic affective interaction to bring into the interaction new information that provides learning. Information collected during the piloting of the scale led into concluding that these were the terms that might be difficult to understand for the judges.

Table 11 - Opinion Scale - Assessment of Teacher/Child Interactions

		Strongly disagree	Disagree	Somewhat Agree	Agree	Strongly agree
FDI	The activity helps facilitate interactions					
IAT	The teacher incorporates turn taking into the activity					
CIC	The child initiates communication					
RIC	The teacher responds to child's initiations					
AAM	Enjoyable and motivating activity					
ICC	The child interprets child's behavior as communicative					
RRF	The teacher paces interaction according to the child's needs					
POI	The teacher misses opportunities for communication					
IPA	The teacher develops interactions that provide opportunities for learning					

Each group of judges observed four videotaped sessions, corresponding to the videotapes used in systematic observations. Of these videotaped sessions, two (one for each case) were post intervention sessions. There was no mention of an intervention process before the observation. Judges were told that the goal was to assess teacher/ child interaction throughout the videos. Intervention assessment goals were also mentioned at the end of observations.

Videos were shown in a random sequence in order to prevent the effects of a possible evolution of teacher/child interaction throughout the school year in judges' appreciations. Judges observed each video session once and checked their opinion immediately after video observation.

Data from the Likert-type scale was explored through descriptive analysis and descriptive statistics. Modes were calculated to describe results, and the Kolmogorov-Smirnov goodness of fit test was used to analyze agreement among judges' responses. Response labels were transformed into figures to facilitate analysis. Responses concerning item POI (*the teacher misses opportunities for communication*) were reversed as it's meaning had an opposite direction when compared to the other items in the scale.

D*escriptive statistics* was used to describe results. Mode values were calculated for each item and session and supported the description of results. Description compared results across items and included an account of possible reasons for the observed results.

The Kolmogorov-Smirnov goodness of fit test was used to assess levels of agreement among judges. Results of the Kolmogorov-Smirnov test were used to analyze the significance of scale results.

Interviews

Initial interviews were carried out in January 2000. Final interviews were carried out in July 2000. Results were used to answer the following questions:

1. What are the communicative forms and functions used by children?
2. What are the communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
7. Do teachers miss fewer opportunities for communication after an intervention procedure?
8. Does intervention improve teachers' interactions with children with multiple disabilities?

Data collection

A semi-structured type of interview was used to interview teachers. The goal was to get teacher's opinions and views about the communication process with their pupils, which required setting up initial questions and subsequent opportunities to ask probes so that teachers can expand and clarify their answers.

Interviews were conducted following a designed protocol. For question refinement the interview protocols were discussed with a teacher who was not involved in the research process, and necessary changes were made. Interview protocols are included in Appendix E.

Teachers were interviewed in the beginning and at the end of the research process. Teachers' initial interviews were aimed at collecting information related to 1) teachers' opinions on the child, 2) teacher's concerns about communication with children, 3) the way they tried to make themselves understood to the child, and 4) their ideas about their own learning process in dealing with these children.

The final interviews dealt with 1) teacher's opinions related to the intervention process and its possible consequences in their practice, and 2) teacher's final appreciation of their work with the particular child throughout the year.

A minidisk audio system was used to audiotape interviews. Interview records were transcribed and indexed. Teachers were asked to read and correct transcriptions before analysis. The information that teachers decided should not be included in the study was not content analyzed.

Data analysis

Thematic analysis of one interview was performed in cooperation with a professional trained in analysis to provide for inter-rater reliability. A matrix of analysis was used for all interviews. Table 12 shows an example of this matrix.

Table 12 - Interviews - Matrix of Analysis

Units of meaning	Indicators	Subcategories	Categories
"She is an easy child"	No problems in her contact with Maria	Easy to contact	Maria's characteristics
F - very easy, poor thing. So easy to please…. Except for the moments when something is wrong. Then she wines a bit. Altogether she is very nice, …very friendly	Maria is a nice and friendly girl	Easy to contact	Maria's characteristics
F - Do not ask me how, but usually we get there [to understand her]	It is possible to understand what Maria wants	Maria makes herself understood	Communication
F - ….we find out when she has cramps, because if we massage her belly she quiets down.	M can express pain	Maria makes herself understood	Communication

Interviews were analyzed and analysis reviewed one month later. The second analysis aimed at checking on the precision of previous analysis and making the necessary changes. Categories that emerged supported the description of results.

Procedures for the intervention program

This study also included an *intervention procedure*. The goal was to determine whether an intervention based on a) discussions with teachers based on videotaped teacher/child interactions and, b) implementation of simple strategies devised to answer teacher's most urgent needs related to their communication with the child, would improve teacher/child interactions. Data collected intended to respond to research questions number seven (do teachers miss fewer opportunities for communication after an intervention procedure) and eight (does intervention improve teacher's interactions with children with multiple disabilities).

The intervention procedure carried out was conducted after all participant observations, three of the four systematic observations and the initial interviews were performed.

Methodologies for intervention included: 1) discussions with teachers watching their communication behaviors on videotape and, 2) development of a communication intervention plan.

Discussion with teachers

Video clips of interactions between teacher and child were selected for discussion with teachers. The selected video clips contained a) situations in which the interaction was successful and turns were kept between teacher and child and, b) situations in which the child exhibited behaviors that could have been used to improve interaction and were not responded to by the teacher.

Video clip observation and discussion was conducted with each teacher individually. Initially these sessions were intended to be conducted with both teachers at the same time, as it might create opportunities for discussion that would be helpful for both teachers. Still, due to distance and unavailability of both teachers at the same time, such sessions were scheduled with each teacher individually.

Throughout video observation teachers were asked to select moments they considered as successful interactions. The researcher pointed out children's behaviors that could also have been used to increase interaction. Another discussion followed about the reasons why some moments were more successful than others. Teachers were also asked to express their main concerns and needs concerning communication with the pupil. Such information served as a basis for the development of an intervention plan.

Development of a communication intervention plan

Based upon video observation and discussion, the program agreed upon was summarized by the researcher and shared with each teacher. Written materials about communication with children with multiple disabilities were also provided to teachers.

Intervention programs included a brief description of the child's communicative needs, the needs expressed by teachers and suggestions for intervention that respond to the teachers expressed needs. Intervention programs are included in Appendix F.

Teachers were asked to use this program, and plans were made to re-observe teacher/ child interaction a month later. The last video recording session was carried out without any directions to teachers much in the same way the previous ones were done. Results of this observation were content analyzed in the same way as other systematic observations were observed.

In order to quantitatively assess the intervention process the amount of child's behaviors that were not responded to by the teachers was selected as an indicator of teacher/child ability to interact. In both cases teachers had pointed out a need for more interaction. Programs therefore asked teachers to attend and respond to child's behaviors as communicative, as a way to decrease the number of missed opportunities for communication.

The average number of missed opportunities for communication per minute in the pre intervention sessions was calculated. The obtained number was used to calculate expected missed opportunities for communication in the post intervention session. Expected and obtained results were compared and described. Data helped answer question number seven (do teachers miss fewer opportunities for communication after an intervention procedure?).

Data from the Likert-type scale was used to rate interactions and partially support assessment of intervention. The resulting information helped answer research questions number seven (do teachers miss fewer opportunities for communication after an intervention procedure?) and eight (does intervention improve teacher's interactions with children with multiple disabilities?).

The following chapter presents results of participant observations, systematic observations, interviews and the Likert-type scale.

RESULTS

This chapter presents results of: 1) participant observations, 2) systematic observations, 3) interviews, and 4) the Likert-type rating scale. Participant observation´s results include data relating to settings, classrooms and activities. Although these data was not analyzed it was included as a means to support the understanding of the context in which observations were carried out.

Participant Observations

Settings

Both schools are located in the Lisbon area and provide services for learners with severe special needs including cognitive challenges and multiple disabilities in segregated settings. Both schools work as an alternative to inclusive education. Special Education Coordinating Teams, which supervise education of children with special need in the area, refer children the schools whenever resources in regular schools do not provide for appropriate education of learners with special needs.

Learners in Anna's school range from seven to 23 years old. In Maria's case, learners in school range from five to 25 years of age.

In each school a multidisciplinary team assesses learners and writes the IEP (Individual Educational Plan). IEPs state the type of services children will benefit from and include goals and objectives for developmental areas.

School staff includes in both cases, and apart from teachers and teacher aides, one psychologist, one social worker, one speech and language pathologist, one occupational therapist and one physiotherapist.

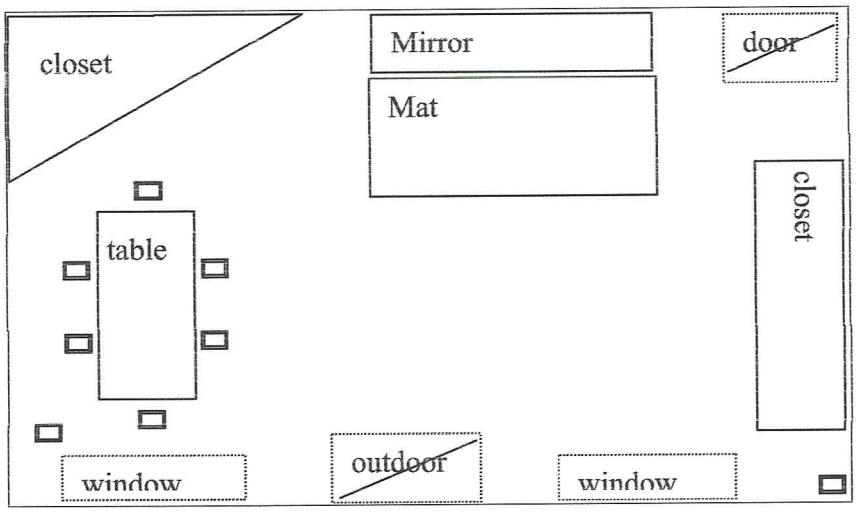
Classrooms

Anna's classroom

Anna is part of a group of six children aged seven to 11. All children have been diagnosed as having multiple disabilities. Types of disabilities include one child with cerebral palsy, visual impairments and cognitive challenges, one child with autism, two children with severe learning disabilities and cognitive challenges, one child with motor, sensory and cognitive disabilities (Anna) and one child with Down Syndrome.

The classroom area is about 3,5 x 2,5 meters, with an outside door entrance. Learners of other classrooms use this door to move back and forth to the playground, often disturbing classroom dynamics. There are one table, eight chairs, a mat and two closets in the classroom. On the wall next to the mat there is a mirror. On another wall there is a calendar displaying the days of the week and pictures of children attending class on that day. Closets hold mostly games and puzzles typical of normal preschool classrooms. There are a preschool teacher and a teacher aide in the classroom.

Figure 1 -Map of Anna's Classroom



Children spend their time either in the classroom or in therapy sessions. Each child has Occupational Therapy, Physiotherapy and Speech and Language Therapy two times a week each.

There are two outdoor activities per week: horseback riding and swimming. Learners also go occasionally on field trips to the park nearby or to the beach. These visits are sometimes organized in cooperation with other teachers from school. There is no involvement of children or families in the planning of any of these activities.

Activities in class are typical of preschools, such as tabletop games and use of materials such as foam or play dough. All pupils are involved in toilet training programs.

Maria's classroom

Maria is part of a group of five children aged eight to 14. All learners have been diagnosed as having multiple disabilities. Learners display different levels of motor impairments combined with severe cognitive challenges. Two learners (Maria and another learner) have also visual impairments. Three learners are non-ambulatory.

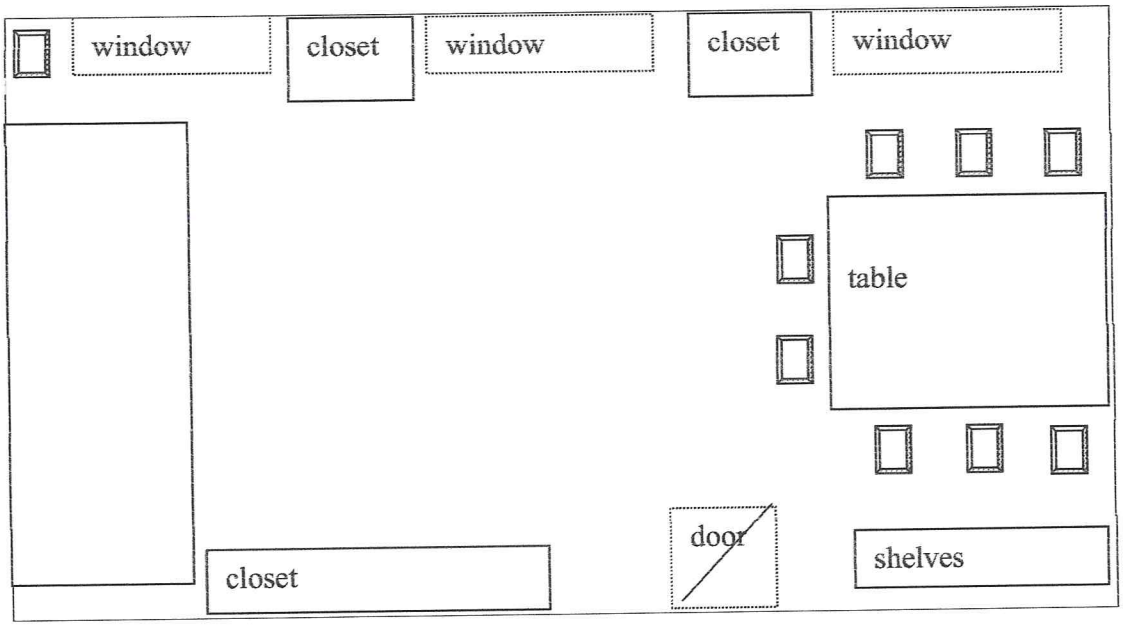
The classroom area is about 3 x 8 meters. The room has a small table used for lunches, several mats and closets. On the shelves there are some switch activated toys and a tape recorder. Closets hold puzzles and preschool activity materials. A wide-open space in the middle of the room allows for wheelchairs to be placed.

There are a preschool teacher and two teacher aides in the classroom. Learners spend most of their time in class, in the playground or in therapy services. Occasionally the school organizes field trips that all learners attend. Activities in class are mostly preschool activities related to sensory development. Children are individually prompted to participate in activities through direct intervention of teacher and teacher aides.

Each pupil also benefits from Speech and Language Therapy, Occupational Therapy and Physiotherapy services twice a week. As those services are not integrated in classroom activities, a considerable amount of time is spent outside the classroom.

The school is involved in an augmentative communication project designed to implement communication alternatives for pupils who do not use oral or sign language.

Figure 2 - Map of Maria's Classroom



Activities

Of the observed activities, four activities for each child were analyzed using participant observation techniques. In Anna's case activities observed were 1) ripping and gluing paper, 2) peg board playing, 3) occupational therapy, and 4) speech and language pathology.

In Maria's case activities observed were 1) cause-effect activities, 2) leisure time, 3) relaxing, and 4) exploring a touch book with the teacher.

Results from observations were analyzed through thematic analysis, revealing information related to five domains of interest: 1) Communication, 2) Child's involvement in activities 3) Adults' role in the activities, 4) Rhythm and movement and, 5) Sensory input.

Results of observations in these five areas of interest in relation with each of the studied cases are described below.

Anna

Communication

Anna's more frequent communicative forms are smiling, changes in position, vocalizations and movements such as moving her hands back and forth on the table. Although observation did not detect intentional communicative initiation behaviors, Anna can request for continuation of rhythmical behaviors started by an adult by reaching out and touching the adult.

She reacts to being touched and understands touch cues (e.g., gets up when patted on her back), object cues (e.g., goes to the toilet when she sees a piece of toilet paper) and natural signs (e.g., sign for "come"). Her reactions are inconsistent which makes people question her capabilities. When she wants something, such as play dough or to go play with the flush in the bathroom, she stands up and does it.

Adults do not usually interact with Anna. They talk at her but they do not communicate with her. Although any behavior can be used to start communication, adults do not detect and respond to Anna's behaviors. Adult's initiations consist of occasional verbal comments (e.g.," what a nice dress you have Anna!") or verbal commands (e.g., "come here").

It was interesting to note that when Anna produces a sound, usually a vocalization, adults in class always reply to her: "What is it Anna?" Adults also respond to what they

consider inappropriate behaviors by directing her attention to it (e.g., "no drooling!"). Still there are no expectations about Anna taking a turn after these interventions.

Anna does not initiate communication intentionally. Observation did not detect any attempt to initiate communication. Neither adults nor children attract much of her attention although she doesn't react negatively to their presence. Occasionally she reacts to an adult sitting next to her by leaning on the person's shoulder. Also she occasionally reached out to touch the child next to her and looked at him when he cried or screamed.

She can request for more of a movement initiated by an adult by reaching out and touching people either with her hand or her body. By doing so she can keep some turns in an interaction, as long as the adult maintains the interaction going. An example from one observation depicted the following interaction:

"Anna is sitting next to the teacher. The teacher helps her and another child to do something. Anna puts her chin on the teacher's arm. The teacher starts a rhythmical movement with her arm, up and down. When she stops, Anna puts her cheek again on teacher's arm. The teacher moves her arm again then stops. Anna puts her chin again on teacher's arm. The sequence goes on for a while."

During movement and music activities she sometimes imitates movements related to parts of the music.

Anna does not react to speech although adults use mostly speech to communicate with her. She reacts to sound and seems to like it. Still, her reactions made the observer question her hearing abilities.

The teacher's understanding of Anna's speech comprehension abilities is inconsistent. She says that Anna understands speech but doesn't want to answer. " I talk to her because I think she understands. But sometimes she doesn't want to answer." Other times the teacher reports difficulties in her communication with Anna, saying that "I do not understand if she

understands me or not". The teacher also mentions that she would like support from the speech language pathologist to "give me some clues... because I am not getting it (a way to communicate with her)."

The teacher's aide, who has known Anna for long, also states that she is able to receive information through speech:

> Well, maybe she doesn't respond [when asked to do something], yes, she might not respond. But I think she understands. She doesn't want, she doesn't like it, she is not in the mood for that, but I feel that she keeps what we say in her mind. I do not know why I have this idea about her....

The teacher aide's comments on Anna's functioning suggest that Anna responds when directions are given with concrete support, such as objects or natural signs. "When I give her a piece of toilet paper she immediately goes to the bathroom," the teacher aide said, "and when I reach out for her hand she comes with me…"

A question was retained about the reasons that lead adults in school to say that Anna understands speech. This question will be brought back in the discussion of findings.

Not many things seem to have meaning for her. Her responses demonstrated that her more consistent responses are related to daily living activities such as mealtimes, or regular routines such as going to the swimming pool. One-on-one interactions in Occupational Therapy and Speech and Language Therapy sessions revealed that Anna responds to activities involving objects and touch.

During an Occupational Therapy session Anna was first asked to play with image representations (combining two shapes in a board to produce a house), then she was asked to thread buttons and then to construct towers and trains with cubes. Of these activities, she got involved in threading buttons and somehow also in playing with cubes, although with a lesser degree of engagement. She didn't get involved in playing with the board.

In Speech and Language Therapy Anna and the therapist (SLT) played with a balloon:

> The SLT blows the balloon, and then lets the air hit Anna's face. Anna smiles. SLT blows the balloon again and waits. Anna reaches out and touches the balloon with her hand. SLT directs the airflow to Anna's face. Anna smiles and giggles.

Tactile stimulation and real objects seem to attract her attention the most. Still, these are not used as a foundation to develop communication. School records show that Anna's goals for communication do not rely on these types of findings. Her educational program reveals strategies for communication that rely solely on speech as a means of communication.

Anna's involvement in activities

Anna walks independently and orients herself in school with no problems. Her movements are very slow. Reports mention she has normal hearing and vision. Anna's abilities in dealing with hearing and visual input were often a matter of question during observations.

Anna's answers are very slow. Sometimes, she performs requested actions when adults interacting with her have given up already. In most cases these behaviors are not recognized as answers. When Anna responds people are sometimes already involved in doing something else. An example from an observation of an OT session illustrates this behavior:

> OT shows Anna a few blocks and tells her they are going to make a train. She puts one block after the other, showing Anna what to do. Anna does not react. OT insists, by verbally prompting her. Anna does not react. OT starts putting blocks in the box. Anna takes a block on her hand. Moves it in her hands. Puts it in the box. Then picks

a block from the box and starts putting blocks one after the other, modeling a train. Looks at the train for a while. OT says: nice Anna! A train like the one I did!

Adults in school perceive this type of behaviors as noncompliant although there is some consistency in Anna's responses. When she is asked to do something she responds sometimes when adults have already given up. Again, these responses are triggered by orders that involve concrete information together with speech, and not speech alone.

Observation shows that the use of concrete information such as object cues and daily routines play a very important role in her ability to perform. She responds to situations such as mealtimes, going to the bathroom, or going out by performing the expected actions. Most classroom activities leave her unresponsive.

Anna responds to visual input such as objects (picks up objects handed out to her) and natural signs (gets up when teacher signs "come"). When activities involve the use of two hands such as threading buttons she seems to be more involved. She is particularly interested in tactile and movement stimulation. She likes to keep a small piece of play dough in her hands, rolling it between her hands and fingers or on the table. Her favorite activities are finger-painting and foam playing. When she hears music, she moves close to the tape recorder and positions her head on it. As she can hear the music, it was assumed that either she wants to feel the vibration of the playing tape recorder, which again shows her interest in touch, or her hearing is impaired and she benefits from less distance to improve hearing abilities.

Observation also showed that she smiles and frowns when touched, tickled or moved around. She likes to continue a rhythmical movement by reaching out for adults' hands or coming closer to them.

Anna can imitate movements. Educational reports state that this was one of her first abilities. Observation results show that she imitated rhythmical movements during music class.

In spite of being able to display such behaviors, Anna does not attract positive reactions form adults around her. She is said to be often "dirty," 'drooling" and "smelling bad." Both the teacher and the teacher's aide say that she does not show interest in people or in the environment. The teacher's aide goes in more detail saying:

> No, she does not look for a person, for close contact. But sometimes she explores us with her hands, or she leans on us, or puts her head on our shoulder. Sometimes I bring myself very close to her, to see if she notices me and comes to me.

People in the environment do not spontaneously interact with her. She is very quiet and doesn't disturb others. Sometimes it is as if people do not even notice she is there.

Most of Anna's time in school is spent doing nothing. She can sit for long periods of time without any activity. Sometimes she gets up and goes to lie down on the mat. Apparently she tires very easily.

Anna responds to activities that involve soft materials such as paint, foam or play dough. Other activities, such as ripping paper or gluing leave her disinterested. During observation it was not clear whether she understood what she was supposed to do during activities. Adults expect her to perform some actions (e.g., rip paper, put pegs on a pegboard) but most often she doesn't perform these actions unless someone sits close to her and helps her do the activities. In most cases, such as the paper ripping activity, she seems to have no idea of what she is supposed to do or what the expected result might be.

The same kind of activities has been used for quite a while in class. It is difficult to understand what sense Anna makes of having in front of her the same materials, which she does not make anything with. The way things happen is, for example:

Anna is supposed to put pegs on the board. She stays there, very quiet, with materials in front of her. When the teacher decides to change the activity, she puts the materials away without Anna's involvement in any of this.

Given the absence of communication, which might help bring meaning into such situations, she is left without information about what is happening.

Adults' role in the activities

There are two adults in the classroom, the teacher and the teacher aide. Most of the time only one of them is there. The teacher and the teacher aide take turns inside the classroom, moving in and out of the classroom, which makes it difficult to pay individual attention to children.

Other adults also move in and out of the classroom, mainly due to the fact that the room has an outside door that people keep using to get in and out of the school. It certainly disturbs the setting. After activities are set up, adults sometimes sit next to a child and do things for them. Anna doesn't often get this kind of attention. Since she doesn't cause any disruption, they leave her by herself while attending to other children in class that demand their attention.

The teachers usually give no specific directions related to how the activity should be carried out. They talk to children, giving directions and commands, although some of the children clearly do not understand speech. Although it is not done systematically, sometimes teachers model behaviors for children to perform. Occasionally, the teacher aide helped Anna with hand over hand support.

Adults talk a lot in the classroom but often about matters unrelated to children and activities they are performing. Activities seem to be set to keep children busy, more than being a way for children to learn. Even when adults guide children's actions, their behaviors are often inconsistent. Here is an example:

The activity is ripping paper. The teacher aide started helping Anna, using hand over hand. She put her hands on Anna's hands on top of the table, and pushes aside to rip the paper. Then she leaves to go get something out of the classroom. Anna is left alone…

…The teacher aide comes back. Anna hasn't done anything by herself. The teacher aide asks: "So, what are you doing?" Anna picks up paper. (she seems to have an idea that she should be doing something with the paper). Another child comes in; it is necessary to reorganize places to sit the new coming child. There is some movement in the classroom. Anna is, again, left alone.

Transitions from being with Anna to leaving her alone are not explained to Anna. She has no idea why people are coming in and out, moving close and farther away from her. As observations continued the teacher became more and more attentive to Anna. She often commented about researcher's coming into the room: " Look Anna, there is your friend, now you are going to have a lot of attention!" In some of the systematic observations she sat next to Anna. It was our impression that our attention to Anna caused the teacher to become more attentive to her also.

Rhythm and movement

Anna often engages in rhythmical movements. She taps her hands on the table, moves her hands back and forth on top of the table, rocks herself, and plays with her fingers in a rhythmical sequence. If she has something in her hands she likes to tap it on the table. These movements do not show stereotypical characteristics. These are slow movements with different sets of patterns. It looks as if she is trying to get into a structure. Apparently, rhythm gives her that structure. When she has materials in front of her, such as paper or parts of games, sometimes she throws materials to the floor, again in a kind of rhythmical sequence. She does not do that in an aggressive way. It looks as if she is creating a pattern out of the

throwing of things. She casts away one thing at a time, methodically, and goes on and on until there are no more pieces on the table. These movements look like a search for a pattern, more than random non-meaningful movements. From a communication perspective, it could be interpreted as if she is rejecting the activity. Still, the way she does it doesn't look like a rejection. What exactly does she mean by that?

Her interest in rhythm also shows in her liking of music (see sensory input) and rhythmical movements. During an occasional observation of music activity Anna got involved in turn taking playing with the teacher by alternately taping hands on the table.

Sensory input

Although Anna is reported to have normal hearing and vision, her ability to use it in a functional way was questioned since the first observations. Her reactions to sound and sight are poor in general as compared to her reactions to touch, which are far more consistent. This led the researcher to questioning her information processing abilities, since at a sensory level Anna is said to have no problems.

Anna can visually fixate, locate and track objects and people. Apparently she uses her vision better when objects are located at her eye level instead of down on the table. It was not possible to find out about scanning abilities.

Reports do not provide information on her visual field. Still it was clear during the OT session that Anna responds more clearly when materials are located in front of her eyes than on the table.

An example of her hearing abilities was observed during a speech session. Anna reacts to sound inconsistently. Sometimes she reacts to quite soft sounds, and at other times the same sounds leave her unresponsive. She seems to need a level of intensity higher than normal to respond. When she likes a sound, like music played on a tape recorder, she keeps listening to it over and over again.

Anna and the Speech Language Therapist (SLT) are playing with a tape recorder. SLT puts the music on without Anna's seeing. Anna does not react. SLT brings the tape recorder into her sight. She takes Anna's hand and uses Anna's finger to switch the tape recorder on. Anna picks up the tape recorder and brings it close to her head. She can feel the tape recorder with her head. SLT turns the recorder off. Anna turns it on again, immediately. SLT reduces the sound keeping it in a low level. Anna tries to switch on the tape recorder. She thinks it is off.

Anna probably hears human voices, but she does not respond to them. Observation did not notice her responding when being called nor did she ever answer spoken directives and spoken questions.

Anna responds to visual input such as environmental cues (e.g., knows that it is time to eat when she sees food on the table) and simple signs (e.g., she gets up when the teacher signs "come").

Anna's interest in touch is quite strong. She likes to be touched, she likes play dough, she likes having her hands playing with foam, and she likes finger-painting. If allowed so, she will keep a piece of play dough in her hands, rolling it between her fingers. Teachers usually ask her to put the dough away before starting an activity.

Anna also likes being tickled and stroked. She accepts people's cuddles, and occasionally searches for body contact.

Summary of participant observation of Anna

During observation Anna worked with her teacher, the occupational therapist, the speech and language therapist and the teacher aids. Therefore participant observation also collected information about children's interactions with other adults in addition to the teacher.

During participant observation the observer noted that Anna's communicative forms were smiling, moving in the environment and non-speech sounds She did not initiate communication intentionally and adults in the environment did not respond to her behaviors. Speech was the main form used by the teacher to contact Anna, although Anna did not show signs of speech understanding.

Activities performed in the classroom (e.g., ripping and gluing paper) were usually non-meaningful for Anna. Anna washing her hands was the only activity that was functional during the participant observation. Anna sustained interest for longer periods of time with one-on-one attention from an adult and in activities that involved real objects and rhythmical movements. Her responses to adults' directions were very slow and were not identified as responses. The observer noted that Anna did respond to adult's instructions (putting pegs on the peg board, playing with blocks with occupational therapist). Anna's response took a long time and adults do not give her adequate time to respond.

Anna showed that she likes movement, rhythm and touch with another person. She responded by smiling to social interaction. She responded by smiling to the adult when being touched and rhythmically moved in a swinging motion

Anna responds best to people's touch and to the vibrations of a tape recorder when she placed it against her ear. She did not respond to the speech of other people including her own name. Visually she responded to objects placed at her eye level and in close proximity.

Maria

Communication

Maria communicates through smiling, laughing, crying, whining, and changes in muscle tone and occasional movements of head and hand. She does not move independently and sits in a wheelchair for most of the day. She has some voluntary movements of the head and the right arm.

Although Maria's communicative functions are difficult to assess due to her motor and vision problems, she can express refusal, ask for more and ask for interaction. Example of her asking for attention:

> Maria and the teacher aide are playing. The teacher aide sings and moves Maria around in her arms. Maria smiles. Another child needs attention; the teacher aide leaves Maria for a while. Maria starts crying..... The teacher aide comes back and picks her up. She is very tense, her body in full extension and she is crying. Teacher aide starts again singing and moving her around. Maria stops crying and smiles again.
>
> When she hears music, she stops movement, smiles or stops crying.

Maria enjoys being touched as long as she recognizes the person touching her and is approached with a gentle touch. Unfamiliar sounds or objects give way to expressions of dislike and generalized body movements.

Sometimes it is hard to understand if Maria likes something or not. There are situations when she moves from smiling to expressing dislike without people having a clue of what she really likes or wants.

> During one observation the teacher and the teacher aide were trying to understand why Maria was crying. They kept offering her options, from the pacifier that Maria still uses to moving her into a new position and finally taking her out of the tumble form where she normally sits in. Although there were moments in which Maria smiled, she returned to expressing discomfort, which kept the teacher and the teacher aide looking for other options. None of the options seemed to have a good result, although Maria eventually stopped crying.

Adults use speech to communicate with her. They also interpret Maria's communication forms providing it with meaning and playing what they assume would be Maria's part in the conversation:

> During a one on one activity with the teacher (observing a touch book), Maria showed no interest in the activity, and kept moving her arms and legs, stretching herself backwards. The classroom displayed a loud background noise of other children and teacher aides interacting. The teacher seizing these movements played Maria's role and said: "Do you know what I am reacting to? No? Now, you! Open your ears. It is my music! I cannot hear my music!" The teacher turned the music louder and Maria quieted down.
>
> Referring to Maria's ability to make herself understood, a teacher aide said:
>
> She can [make herself understood]. When she is bored she cries, she moves, she smiles. I say things instead of her. We have to do that because they cannot say what they want. We then say what we think they mean [.....] because then they will know we understand them.

Maria does not clearly respond to speech, but she reacts to changes in intonation and recognizes voices. She laughs and giggles each time she hears the voice of one of the teacher aides that she is reported to like the most. She remains very quiet and attentive when people talk to her with a friendly intonation. Body movement and facial expressions are Maria's most frequent reactions to noise and unknown sounds, such as toy sounds that she never heard.

Maria enjoys interaction and likes to have people talking to her, particularly people that she recognizes. The researcher engaged in turn taking interaction with her at times, sitting next to her, talking with her, and starting a simple tapping game once. Maria got involved in the tapping game, asking for more each time the researcher stopped the game by

slowly moving her hand next to the researcher's hand. Although she responded to the interaction, she didn't smile the way she does when interacting with people that she recognizes. Apparently Maria understood that there was someone different interacting with her.

Maria's crying, laughing and vocalizations are the forms that are more consistently responded to. Laughing brings in comments from teacher or teacher aides such as "What are you laughing about Maria?" When Maria cries both the teacher and the teacher aides actively look for possible causes for crying and try to change it. Still, they are often not sure of the causes of her crying.

Teacher and teacher aides also respond to Maria's vocalizations with brief comments, such as " Oh! Are you talking to me?" or interpretations "You don't want to work, right?" but they do not expect a response nor do they go on with any attempts to engage in interaction. Adult's interpretations of Maria's vocalizations are usually limited to what they already know Maria likes or wants. There are no expectations about Maria trying to express anything new.

Using a head switch Maria can activate a tape recorder and play with toys producing sound. Unfortunately, for most of the time observations were carried out, a head switch was not available and it was not possible to fully assess how Maria uses it for communication.

Maria's involvement in activities

Maria usually reacts positively to activities by smiling and engaging in the activity as much as she can. When she does not like the activity she reacts by pushing herself away.

Maria's visual limitations make it very hard for her to anticipate activities in class. When teachers and teacher aides describe activities that they will be doing other children can see what materials are being set up. Maria cannot pick up on visual information and her

speech understanding is very poor. It is difficult for her to anticipate what will be happening in class.

Activities in class are mostly developmental kindergarten-like activities that do not adapt to the ages of children in the classroom. Also, due to severe motor limitations of most of the children in class, these children do not actively engage in such activities. They need full assistance to participate in any kind of activity.

Maria needs total support in activities that require motor movements. When she gets such support she demonstrates her happiness.

> Teacher aide and Maria are listening to the tape recorder. Teacher aide stops the tape recorder and then switches it on using Maria's foot. Maria laughs and giggles, seems very pleased.

Because her head switch was not functioning, Maria was sometimes encouraged to use a table switch that she has great trouble activating. During one observation it was noticed her actively trying to activate the switch by slowly sliding her hand along the trail, finding the switch, then pulling her hand up to hit the switch. Many of her trials were unsuccessful. When she did manage to activate the switch, she showed her pleasure with a large smile. Still, after trying for a few times without success she gave up on her trials. It seemed too big an effort for her to enjoy the activity for long.

Although she has significant problems with voluntary movements Maria tries to initiate moments within an activity, such as activating the table switch to listen to music or trying to move her hand into her peer's sink which she had accidentally found by moving her hand around before. Both a head switch and more support from the teacher or teacher aide might improve her performance and let her participate more in some activities.

Adults' role in the activities

Adults in class pay a lot of attention to Maria, by responding to her communicative initiations, particularly vocal initiations. Speech without support of concrete forms of communication is the main form of communication used by adults to convey information. As mentioned before the use of speech is not aimed at developing interaction through the increase of turn taking. It is either a response to Maria's behavior or a way to convey information about the activity. It does not include strategies to keep interaction going. Ongoing interactions were observed only when Maria was in a one-on-one interaction with teacher.

For structured activities Maria is individually supported by one of the adults in class. Adults distribute their attention among children. The adult's roles were mostly directed to setting up the activity, positioning children, helping them access and manipulate materials, and performing some of the activities so the children were not actively involved. For example, Maria has some voluntary movement in her right hand. Adults grabbed her wrist and put her hand on the switch to activate the toy instead of letting her initiate the movement. Later Maria and an adult were using a *tactile book*[5] and Maria's hand was manipulated to the texture before she had a chance to initiate a movement with her hand. Because of her inability to see Maria had no way to anticipate the activities. Purposes of activities and changes in activities were not explained so Maria could understand.

The teacher does not have a specific activity plan for the periods of time children spend in the classroom. Children's schedules involve one-on-one activities with PT, OT and SLT. During the time that is left for classroom activities the teacher organizes kindergarten like activities. There is no specific mention of functional activities in children's schedules.

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[5] tactile book - a book with raised level pictures and different textures

Rhythm and movement

Maria enjoys rhythm and movement. She likes PT activities and going to the Snoozelan room, a sensory room with a waterbed and visual and sound stimuli around.

Maria engages in turn taking activities when the teacher starts rhythmical activities such as bouncing. She quiets down when the teacher bounces her and sings to her. She seems to pay attention to it and enjoy these activities.

Maria likes movement and speed. During observation the teacher reported that when they go on car trips Maria always complains when the car stops. One of Maria's favorite activities is being pushed very fast in her wheelchair.

When lying on a mat Maria tries to move around by moving body and legs. Apparently she initiates more movements when she is left free on the floor that when she is on her wheelchair.

Sensory input

Maria has cortical visual impairment. During participant observations she did not respond to visual stimuli related to classroom lighting, people and objects.

Maria is reported to have normal hearing. She responds to sound and voices, and reacts differently to different voices. On occasions she directed her face towards familiar people who interacted with her by speaking. She recognizes familiar people by their voices. When there are unfamiliar sounds in the environment she reacts with body tension, generalized movements and crying.

Maria likes being touched by familiar people. Sudden unknown sounds or touching unfamiliar objects frighten her because she cannot anticipate visually (e.g., touching an unfamiliar teddy bear that made sounds).

Summary of participant observation of Maria

In addition to the time Maria spends in class with the teacher she also works with the speech and language therapist, and teacher aides. Therefore participant observation also collected information about children's interactions with other adults.

Maria communicated through the use of smiling, laughing, crying, whining, and changes in muscle tone and movements of her head and right hand. The functions of communication observed were *asking for attention* (whining or moving and smiling), *refusal* (grimacing), *asking for more* (moving her body), and *asking for interaction* (hears voice of preferred person and makes rapid body movements and smiles).

Adults use mostly speech to communicate with Maria during activities. They comment on Maria's vocalizations and body movements but they do not expect her to respond. Maria does not actively participate in classroom activities. Although she requires physical assistance because of her severe physical disabilities adults did not give her opportunities to use her hand movements in activities. Often adults do the activity for her and not with her.

No functional or real life learning activities were used in teaching Maria. Activities such as playing with switch activated toys and feeling textures in a touch book were observed. Maria was motivated by the person encouraging her to do the activity. Maria enjoys activities that involve rhythmical movements such as bouncing. She likes fast movements such as having her wheelchair moved fast.

Maria uses her hearing well, she can discriminate between familiar and unfamiliar people by their voices, and she likes being touched by a person she knows. Maria ability to understand speech was questionable during the observation.

Because of her physical disabilities she cannot reach out and touch things independently. When she touches with assistance new objects she becomes frightened and communicates this through crying and body tension.

Results of participant observation provided data concerning: 1) Communication, 2) Child's involvement in activities 3) Adults' role in the activities, 4) Rhythm and movement and, 5) Sensory input. The next session describes results of systematic observations.

Systematic Observations

Data collected for systematic observations results from observation and videotaping of each teacher/child dyad in four activities. Of the four activities, one was observed after the intervention process.

Videotapes were transcribed and interactions were displayed in matrices that supported data generation and analysis. Analysis designed to partially respond to research questions covered, a) identification and counting of communicative initiations of both teacher and child, b) counting and describing of turn-taking interactions, c) coding and categorization of communication forms of teacher and child, d) coding and categorization of communication functions expressed by teacher and child, e) identification and description of behaviors that were more often responded to by the teacher and, f) identification and counting of missed opportunities for communication.

Counts and percentages of data related to research questions #1 (what communicative forms and functions used by children), #2 (what communicative forms and functions used by teachers), #3 (how do teachers and learners engage in turn taking activities), and #4 (what communication behaviors do teachers respond to), were calculated only to enrich the overall description of the data. Data from item five (missed opportunities for communication) was selected across sessions as a common indicator of the teachers' ability to interact with

children. Data from observation of this item were quantified and used to compare pre and post intervention sessions and assess intervention results.

Videotaped sessions represent different activities. Characteristics of the activities are described according to: 1) the place where it happened, 2) the type of activity, 3) its goals and expected outcomes, 4) the distance between child and teacher, 5) the position of the teacher in relation to the child and, 6) the type of contact established.

Results of each case study are presented independently and therefore focus on different issues within the items selected for analysis. This provides for richer and more comprehensive information related to each case, since activities and partners are all different, and therefore interactions might show unique characteristics. The following sections therefore describe the results of Anna and Maria's systematic observations separately.

Anna

Four activities were observed and videotaped in Anna's case. The activities are foam playing (A4), hand washing (A4A), paper gluing (A6) and music (A10). A10 (music) is the post intervention session.

Characteristics of videotaped sessions

Videotaped activities A4 (foam playing), A6 (paper gluing) and A10 (music) happened in the classroom. Videotaped activity A4A (washing hands) happened in the bathroom. Table 1 shows the main features of each session. Activity labels relate to the chronological sequence of observations/videotapes.

In session A4 (foam playing) the teacher was in the room but does not have contact with Anna. The teacher was in the opposite side of the table, watching children playing with foam. There is virtually no interaction between Anna and the teacher whereas in the remaining activities the teacher is in a one-on-one relation with Anna, close to her, therefore creating opportunities for physical interaction or communication.

In A4A (hand washing), Anna is in close contact with the teacher and probably understands what needs to be done because she was taken to the bathroom with dirty hands. Also, the activity involves the use of water and soap which she likes touching and playing with. Observation shows Anna anticipating/initiating with purposeful movements, such as putting her hand under the tap to get water.

Table 13 - Anna - Characteristics of Observed Activities

Session	Place	Activity	Anticipation cues	Goal	Outcome	Distance between teacher and child	Positioning	Contact between teacher and child
A4	Class-room	Playing with foam	Anna sees foam being spread on the table + Verbal command	Sensory Stimula-tion	No	More than one meter Teacher is away from the table.	The teacher is on the opposite side of the table, on the right hand side	Visual Hearing
A4A	Bath-room	Washing hands	Dirty hands Going to the bathroom	Autono-my	Yes (washed hands)	Physical contact	Behind Anna during washing	Visual + Hand over hand + Hearing
A6	Class-room	Paper gluing	Materials are put on the table + Verbal command	Sensory Stimula-tion	Yes. Paper glued will produce a puppet, but Anna does not know it.	Physical contact or minimal distance	Side to side	Visual Hand over hand + Hearing
A10	Class-room	Music	Verbal command	Sensory Stimula-tion	No. There is no indication that Anna recognizes any of the musics	About 50 cm.	In front of Anna	Visual + Occasional hand over hand + Hearing

A4A (hand washing) is a daily routine activity, performed several times throughout the day, which probably helps Anna understand what she is expected to do, eventually

making her more active. Also, and because it is often performed, Anna has probably learned more about this activity that about any of the others, which accounts for her success in doing parts of the activity on her own.

The beginning of session A4A (hand washing) includes a series of turns between teacher and child, which are a play situation based on movement. During these moments Anna and the teacher establish visual contact, which only happens again in A10 (music).

In A6 (paper gluing) there is an expected outcome for the activity (in the end there should be a human figure drawn from gluing pieces of paper) which could have been useful to get the child involved in the activity, had it not been for the fact that Anna does not show any signs of knowing what the outcome might be. Although the teacher spoke to Anna telling her what they were going to do, there is no indication that Anna understood what she was supposed to do. A drawing of the image on paper, suggesting the desired outcome, would have helped Anna understand what she is supposed to do.

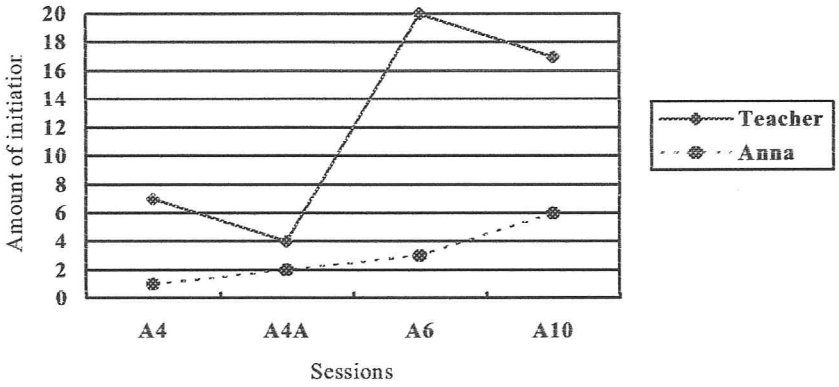
In A10 (music) the teacher creates opportunities for rhythmical movements, which Anna enjoys. During the activity there were frequent turn taking interactions and also Anna's imitation of the teacher, which were not noticed in any other activity. The rhythmical component of the activity seems to play a positive role in the development of Anna's active participation. In fact, as already mentioned in the description of participant observations, Anna likes to involve herself in rhythmical movements and enjoys adults responding to her movements.

Initiations

The teacher initiated interactions more often than Anna. Table 14 shows initiations of both Anna and the teacher. The highest number of teacher initiations was noticed in A6 (paper gluing), during which there was a clear task to be performed by the child (to glue

pieces of paper), therefore creating natural opportunities for the teacher to initiate communication by requesting the child to perform necessary steps.

Table 14 - Anna - Initiations of Teacher and Child



An increase of child initiations was noticed across sessions, which might indicate according to the definition of initiation, more responses from the teacher and not more intentional behaviors from the child.

Teacher's initiations usually gave way to interactions of just one turn. In most cases the child's response ended the interaction. Still, in session A4A (hand washing) and A10 (music) there were interactions of more than ten turns initiated by the teacher. In A4A (hand washing), teacher and child got involved in a long interaction during which they played with movements (the teacher interpreted a movement of the child as a request for interaction and responded to it by starting a playful interaction that involved touch and movement).

Turn taking interactions

Analysis of turn taking interactions was based on the definition of turns included in the description of methods. Both the frequency of interactions (amount of interactions per session) and the amount of turns in each interaction were analyzed.

Frequency of interactions

The amount of interactions between Anna and the teacher increased along the sessions, ranging from very little interaction in session 4, during which teacher and child interacted 8 times over a period of 10 minutes, to session 10 during which teacher and Anna interacted 23 times over a period of 13 minutes. Table 15 shows the number of interactions according to each session.

Table 15 - Anna - Frequency of Interactions in Each Session

	Session	Duration	Nº of interactions
Pre intervention sessions	A4	10 min.	8
	A4A	8 min.	7
	A6	17 min.	23
Post intervention session	A10	13 min.	23

Characteristics of observed activities, particularly the nature of the activity itself and the proximity between Anna and the teacher, apparently play a role in the frequency of interactions noticed. This assumption lead into further exploring possible reasons for differences in turn-taking across sessions.

Exception made for the activity in session A4A (hand washing), which is a functional activity with an outcome that seems obvious to Anna (hands clean), the remaining activities all have in common the fact that they are performed in the classroom and there is no clear outcome for it. In these activities the teacher did not inform Anna of what she is supposed to do. Anna does not have a way to anticipate what is expected from her.

In A10 (music) Anna is involved in the activity. She seems to enjoy music and rhythm, which in itself might provide her with an outcome for the activity. The rhythmical, recurring type of activity, during which teacher and child perform sequences of movement

patterns, seems to create more opportunities for interaction that any of the other activities. Anna imitates the teacher, which was only noticed in A10 (music), although reported as a skill in school reports.

The question remains of why Anna imitates the teacher in this activity. Although it might seem obvious that she imitates because the activity itself requires it, the fact that she displays imitation skills is important. Why does Anna use these skills in this activity and does not do it in other activities?

One possible explanation relates to the nature of the activity itself. It is a simple, repetitive activity. There is no need for higher levels of cognitive operations. No problem solving needs such as in activity A6 (paper gluing) where she had to figure out what to do with a piece of paper and glue I her hands, no decision making problems such as in A4 (foam playing) where she was left in front of a table with foam on top. Imitation of teacher's movements is, in this case, enough to be successful. It certainly brings in confidence and sense of accomplishment to the child.

It is interesting to note that she does not use the same strategy (imitation as a way to be successful) across sessions. In A4 (foam playing) and A6 (paper gluing) she apparently has an idea that something is expected from her although she does not know what it is. Or she might simply feel more motivated in A10 (music) and therefore more involved in the activity.

Another explanation relates to positioning of both teacher and child. This is the only activity that facilitates eye contact, establishing a closer contact between both. The teacher uses it to stimulate Anna to imitate her movements. She looks for this contact even saying to Anna, at some point: " look at me!" Still the teacher does not use this strategy in any of the other sessions.

A final hypothesis relates to the nature of the activity and the way it impacts on Anna's. Observation showed Anna often tapping on the table during participant observations, somehow trying to get into a rhythmical pattern. She does it on her own possibly as her own way to bring order into a world that does not provide her with enough structure. It is possible that an activity that builds up on this type of behaviors, such as A10 (music), brings her more information and therefore raises her level of participation.

Amount of turns in interactions

Most interactions between Anna and her teacher have only one turn. It is usually a teacher's initiation and a response from Anna's. Tables 16a and 16b display the length of interactions per session according to the number of turns.

An analysis of interactions with higher number of turns (A4A (hand washing) and A10 (music) shows that these are rhythmical interactions in which movement and rhythm are the basic components. There is no further meaning attached to messages being sent, which makes interactions flow easily. The patterns shown are very similar to those performed by mothers and infants during early turn taking episodes. It is the rhythmical and synchronic nature of the movements that keeps the interaction going.

Table 16a - Anna –Teacher: Initiated interactions and number of turns

Number of turns	Session A4 (10 min.)	Session A4A (8 min.)	Session A6 (17 min)	Session A10 (13 min)	Total
1	6	0	15	13	34
2-5	1	1	5	2	9
6-10	0	3	0	1	4
>10	0	1	0	1	2
Total	7	5	20	17	49

Table 16b – Anna –Child: Initiated interactions and number of turns

Number of turns	Session A4 (10 min.)	Session A4A (8 min.)	Session A6 (17 min)	Session A10 (13 min)	Total
1	0	0	1	1	2
2-5	1	1	1	3	6
6 - 10	0	1	1	2	3
>10	0	0	0	0	1
Total	1	2	3	6	12

In A10 (music) interactions with more turns are supported by the nature of the activity as Anna is supposed to imitate teacher's movements. The fact that the child imitates the teacher apparently had a positive impact on the teacher, motivating her to respond and keep the interaction going.

In A4A (hand washing) the longest interaction refers to the initial moments of the activity, when the teacher calls Anna to go to the bathroom. Anna resists and the teacher picks up on her behavior to develop a playful interaction.

In some cases it was difficult to analyze the number of turns in interactions, as Anna sometimes gives quite delayed responses creating overlapping situations in which the teacher had either given up or already started another turn when Anna takes her turn.

An example of such a situation occurs in session A10 (music). The amount of time Anna takes to respond raised doubts on whether Anna's displayed behaviors could be described as alternating turns. It was decided, as defined in the criteria for coding behaviors, that although delayed, this was a response. Timing of teacher's responses seems not to fit Anna's timing. The teacher moves from one movement to another, going on with singing and movements attached, leaving little room for Anna to follow it. There are continuous changes in the type of movements Anna should imitate which might account for her difficulties in pacing with the teacher and perform the desired movement.

Behavior forms and functions

Although types of behaviors for both teacher and child were quantified it is not possible to fully describe these results based only on the number of different behaviors displayed.

There are differences from session to session not just in the type and amount of behaviors but also in the combinations of behaviors that were shown both by teacher and child in each session.

The fact that a behavior form appears more in a given session than in another one does not imply quality changes in the interactions. Some activities were an opportunity for a certain type of behaviors more than others, such as in A6 (paper gluing) where the number of *actions on object* behaviors is directly related to the fact that the teacher wants Anna to put glue on paper. Description rather focuses on categories resulting from content analysis and coding of behavior forms, in an attempt to understand the possible implications of these behaviors in the development of interactions.

Anna's communicative forms

Participant observation has already shown behavior forms that Anna exhibits more frequently. These are smiling, changes in body position (e.g., raising her head) vocalizations and movements (e.g., tapping on the table).

For a detailed analysis of these behaviors systematic observations were content analyzed and observed behaviors coded. Coding was aimed at identifying implications of those behaviors in the interactions, in the absence of intentionality that could help define a function for each specific behavior. In Table 17 Percentages of coded behaviors for each session are shown.

Table 17 -Anna - Behavior Percentages Across Sessions

	A4	A4A	A6	A10
Action on object		9%	31%	6%
Action on own body	2%	12%	2%	4%
Action on person	2%	3%		
Material manipulation	19%		20%	
Accept movement		3%		4%
Stop movement	2%	3%	5%	10%
Attention to adult	7%	3%	2%	
Attention to peer	12%	6%	4%	
Body expression		25%		
Facial expression		9%		2%
Gestures				22%
Changes in position		15%	31%	8%
Rhythmical.contextualized				22%
Rythmical movements	51%	12%	5%	22%
Physiological sounds	5%			
TOTAL	100%	100%	100%	100%

Categorization of coded behaviors resulted in six categories: 1) actions, 2) responses to being manipulated, 3) attention, 4) expression, 5) movements and, 6) sounds. Table 18 shows behavior codes and its description.

Table 18- Anna - Behavior Coding and Categorization

Category	Code name	Code	Description	Example
Action	Action on body	AcC	Movements that have a goal and are directed to own body	Wash mouth
	Action on objects	AcO	Movements that use an object with a goal Different from object manipulation for having a recognized goal	Glue a piece of paper
	Action on person	AcP	Movements that are purposefully directed towards a person either adult or peer	Puts head on teacher's arm
	Material manipulation	MM	Manipulates materials with no defined goal	Repeatedly opens and closes hand on piece of paper
Response to being manipulated	Stop movement	CM	Demonstrates that she wants to stop a teacher initiated movement	
	Accept movement	AM	Demonstrates acceptance of a teacher initiated movement	Keeps her hands in a position modeled by the teacher
Attention	Attention to adult	AtA	Directs eye gaze towards adult. Seems to be interested in adult's action	Looks at the teacher when the teacher moved from one place into the other
	Attention to peer	AtC	Directs gaze towards a peer	Looks at a peer passing in front
Expression	Body expression	EC	Body movement	While playing with the teacher draws herself backwards
	Facial expression	EF	Use of face movements	Smiles
Movement	Gesture	G	Movement of the hands with apparent meaning	Scratches her ear
	Changes in position	MP	Changes of body positioning not related to any specific goal	Raises her head
	Rhythmical movement	MR	Slow, repetitive movements with no apparent relation to the context	Taps on the table with alternate movements of hand palm and wrist
	Contextualized rhythmical movement	MRC	Rhythmical movements related to the activity	Claps hands during music time

The category *Actions* refers to actions on one's own body, actions on objects and actions on another person. Of the total amount of actions displayed, Anna's largest number of actions relates to acting on objects. In this session Anna is supposed to glue paper. The nature of the activity creates natural opportunities to use objects, which probably accounts for the percentage of "actions on object" behaviors. During this session the teacher sat next to Anna helping her perform the activity, which might also account for her concentrating on the activity and therefore using objects in the expected way.

Actions over her own body, such as washing her face in session A4A (hand washing) or cleaning her mouth in session A10 (music) also help define her activity level. These two examples refer to actions that Anna performed after having been prompted by the activity in session A4A (hand washing), as she was in the bathroom or by the teacher's initiation in session A10 (music) when the teacher gave her a tissue.

Occasionally she acts on a person (a peer), such as in session A4 (foam playing). When her peer G, who sits next to her, screamed, Anna reached out and touched him.

Under the same category (actions) movements were also noticed that were coded as manipulation of materials. These were movements related with objects that did not suggest any purposeful action (ex: the teacher gives Anna a piece of paper to put glue on. She keeps the paper in her hand, opens and closes her hand repeatedly, without apparent purpose).

The category *Response to Being Manipulated* includes stopping or rejecting a movement or accepting a movement.

Anna reacts to being manipulated either by accepting manipulation without acting (ex: in A4A -hand washing- accepts the teacher washing of her face) or by stopping the movement (ex: in A10 (music) the teacher makes her perform a movement using hand over hand: when the teacher takes her hands away she drops her hands). Observations detected

more attempts to stop manipulation than acceptance, which might be interpreted by the teacher as refusals or protests.

In some cases it was difficult to analyze Anna's behaviors. For example, in A10 (music), the teacher modeled a movement by taking Anna's hands to her ears (as part of the movements that go with a song). Anna kept her hands in her ears for some time, after the teacher has started another movement. The teacher had to tell her to take her hands off the ears. This is most probably a delayed response much in the same way she often does, as explained in the section related to the amount of turns of interactions. Still her usual response would be to let her hands drop instead of keeping it in the position that was modeled by the teacher.

The category *Attention* includes attending to a peer or an adult. Coding of Anna's behaviors resulted in small percentages of attention behaviors throughout sessions (see percentage behaviors, Table 6). Still, it should be noted that coding of attention behaviors referred to moments when Anna was attentively looking at an adult or a peer with an expression of interest, without performing any other behavior. Other behaviors could have been coded as attention behaviors had it not been for the fact that they were carrying other actions with it, as it is the case in session A10 (music), when Anna repeatedly imitated the teacher's movement.

The coding of attention behaviors refers to directing attention to a peer doing something (such as in A4 -foam playing- when her peer G. screams and Anna turns her head to him), which is an indicator of a very early communicative ability that apparently has not been followed by more developed attention behaviors. Although Anna showed occasional attention to objects (which were coded as "actions on object") observation did not detect behaviors reflecting joint attention skills.

The category *Expressions* includes body movements and facial expressions. Anna does not cry, move or laugh often. Still, body and facial expressions were detected, particularly during session A4A (hand washing), when teacher and child involved themselves in a turn-taking play interaction. The teacher asked Anna to go wash her hands, Anna moved back, as if refusing to move, the teacher seized this movement and started playing with Anna, tickling her and allowing for a turn-taking game. The teacher tickles Anna, Anna draws herself backwards, then moves forward, the teacher tickles her again, she moves backwards. They go on with this game for a while.

In order to communicate Anna benefits from someone first interpreting her behaviors. This is consistent with the fact that she hardly ever initiates interactions. She also seems to benefit from movement and rhythm in the interaction. When these two components were present Anna takes part in interactions and expresses herself more than in any other situations.

The category *Movements* includes gestures, changes in position, rhythmical movements and contextualized rhythmical movements.

When left unattended, Anna spends long moments performing rhythmical movements with her hands on the table. She taps on the table, moves hands back and forth, and taps with her fingers. Such movements were observed particularly when Anna was playing with foam with no defined outcome, but also across all sessions each time she was not involved in an activity. These results reconfirmed findings described for participant observations (see rhythm and movement in participant observation).

When an activity involves music, such as in session A10 (music), Anna can be particularly involved in performing rhythmical movements. In this case behaviors were coded as contextualized rhythmical movements because they were contextualized by the activity.

Her movement behaviors often include changes in position. In session A6 (paper gluing), changes in position were interpreted as possible ways to move away from the activity. (e.g., turns her head to the side opposite to the teacher; raises her head with her eyes facing the ceiling; drops her head on the teacher's arm).

Anna's communicative functions

From a communication perspective it is the role of teachers to imply intentionality onto behaviors expressed by children in order to develop communication (Downing 1999). Teachers must carefully detect and respond to potential functions of children's expressed behaviors according to the contexts in which behaviors occur.

Anna's communicative functions were not coded and counted mainly because of the lack of identified intentionality in most of the observed behaviors. Still, observation of Anna and the teacher interacting provides some clues about possible functions. Suggestions of possible functions for those behaviors are described below.

Anna shows a number of behaviors that seem to be related to *sensory exploration of the environment*, such as keeping her hands on the foam and moving it back and forth, occasionally feeling it in-between her hands. Teachers can assume such a behavior to be a request for more and more organized sensory information. Other behaviors, such as looking at peers when they make some noise apparently are also a search for information. Such behaviors, when interpreted and responded to by teachers, may provide the child with more information that will support further learning possibilities.

Anna's repetitive movements, such as taping on the table with a fixed pattern could be analyzed as a *need for structure* in the absence of more developed forms of organization. Teachers can join into these movements, acknowledging it as potentially communicative and responding to it by creating turn taking interactions. By joining in, teachers give the child a feeling of their actions being accepted. Many of the non-responded behaviors, particularly in

session A4 (foam playing), are rhythmical movements that could be used to involve Anna in interaction. In A10 (music) the teacher uses this strategy and repeats Anna's movements starting a turn taking interaction.

It is not clear if non-intentional behaviors, such as the rhythmical movements Anna performs, can always be attributed a function by the teacher. In this case it was not easy for the researcher to find one. Van Dijk (1986) suggests a resonance level of interaction in which teachers start interactions by imitating children's movements eventually moving the child to higher levels of communication. Such decisions become important matters in the development of teacher preparation programs. Teachers should be able to decide what is the best strategy to start interacting with a child with multiple disabilities.

In sessions A10 (music) Anna imitates the teacher. It is the only session where the teacher imitates Anna and it provides information on Anna's learning possibilities.

In session A4 (foam playing) Anna reaches out for water to wash her face. The tap is closed. This behavior might be considered as a *request* for water. Again, if the teacher interprets such a behavior she can respond to it and attach meaning to the child's behavior, making it possible for Anna to ask for water in a new situation.

Anna also responds to the interruption of a rhythmical movement by starting it again. In session A6 (paper gluing) the teacher plays with Anna by bouncing Anna's head that rests on her arm. When the teacher stops, Anna presses her head against the teacher's arm. This could be interpreted as a *request for more* of the same activity.

Anna sometimes *responds* by taking an object that the teacher hands out to her. In session A10 (music) she picks up a tissue, and in session 6 she picks up the glue. Still these behaviors happened only on these occasions and cannot be considered as a rule. It is, nevertheless, a sign that Anna can perform at higher levels by directing her attention to an object and eventually acting according to the object's function.

A detailed analysis of longer turns should provide data on possible functions Anna might convey, as well as on the functions of the resulting answers given by teachers. Such an analysis would include gathering data on the teacher's perceptions of potential communicative functions through interviewing and video analysis. This type analysis is beyond the scope of this study essentially for time reasons.

Teacher's communicative forms

Teacher's behaviors were coded and organized in three categories: 1) single behaviors, 2) combination of behaviors and 3) behaviors that were not directed to the child. Categories were chosen in order to explore the teacher's ability to provide the child with additional information apart from speech or in combination with speech. Appendix G shows a code list of teachers' behaviors forms. Table 19 shows behavior forms more often used by Anna's teacher across sessions.

Table 19 - Anna - Teacher's Communicative Forms

	V	M	V+M	V+MM	MM	M+O	V+O	V+MM+O	V+M+O	VND
A4	3	1	0	0	0	3	1	0	1	0
A4A	5	1	1	0	0	0	0	0	1	2
A6	0	0	1	1	1	1	2	2	1	0
A10	6	7	2	8	1	0	0	0	0	1

V-verbal; M-motor; MM-hand over hand; O-object; VND-nondirected to the child

Anna's teacher exhibited different behaviors according to sessions. The more frequent ones are combinations of *speech and movement*, which were identified in activities A4A (hand washing), A6 (paper gluing), and A10 (music). These activities have in common the fact that the teacher is close to the child and the activity involves either movement (rhythmical activity) or a concrete goal (washing hands or gluing).

In session A6 (paper gluing) and A10 (music) there were *hand over hand behaviors combined with speech* aimed at making Anna complete the activity in A6 (paper gluing) or perform the desired movement in A10 (music).

The teacher frequently uses *speech alone*, such as in A4 (foam playing), A4A (hand washing) and A10 (music). In sessions A4 (foam playing) and A10 (music) the teacher also used *movement alone*.

The use of concrete forms of communication such as objects is not frequent in the teacher's repertoire. Combinations of *movement and object* were observed (ex: the teacher put more foam on the table) in sessions A4 (foam playing); *speech and objects* (ex: teacher says: "take it" and hands Anna a tissue) in sessions A4 (foam playing), A4A (hand washing) and A6 (paper gluing); combinations of *speech, hand over hand and objects* (ex: teacher says "first you need to put the glue", while giving Anna the glue and gluing the paper using hand over hand) in sessions A6 (paper gluing), and combinations of *speech, movement and object* (ex: the teacher pulls Anna to the bathroom, gives her a piece of toilet paper and says " look! We are going to flush the toilet) in sessions A4 (foam playing), A4A (hand washing) and A6 (paper gluing).

Results of both participant observations and interviews show that Anna more consistent responses relate to information provided with object support. Systematic observation did not show the teacher using it on a regular basis. This should probably be used consistently as a way to ensure that Anna understands information that is conveyed to her.

Teacher's communicative functions

Teacher's communicative functions were coded according to the list shown in Appendix H. In table 20 the functions more often used by the teacher in each session are

displayed. These codes were used to describe Anna's teacher communicative functions in her interactions with Anna.

Table 20 - Anna - Teacher's Communicative Functions

	P	CA	INF	C	FA	I	PR	PC	INC	O
A4	2		4							3
A4A		3	3	6					6	9
A6	2	5	16	6	3		1	1	6	24
A10			23	4		3				9

P -question; CA -directs attention; INF-informs C-comments; FA-facilitates action; I-imitates the child; PR-searches for a response-; INC-prompts; O- commands

An analysis of Table 21 reveals that the teacher's highest numbers of functions are *directives, provision of information and comments*. *Directives* occur in all sessions, with a highest number of 24 in session A6 (paper gluing) where the child had to perform an activity with a clear outcome (a body picture made of pieces of glued paper). *Information provision* also occurs in all sessions with a highest number of 23 in session A10 (music) where the teacher provides the child with information on what she is supposed to d by using movements that she expects Anna to imitate. A third group of functions includes *comments*. The teacher expresses comments (e.g., "This is nice") in sessions A4A (hand washing), A6 (paper gluing)) and A10 (music).

Teacher's communicative functions are frequently expressed through speech, which limits the communicative impact it could have on Anna's, therefore explaining somehow the lack of responses.

An analysis of a) the forms that are more often used to express certain functions, b) the combinations of forms this teacher uses more frequently and c) the convergence or divergence of contents in messages conveyed through the use of more than one form, would provide interesting additional information and help describe in more detail the communicative characteristics of this teacher. Such an analysis is not possible in this study particularly due to time limitations.

Behaviors more often responded to by the teacher

Anna displays different types of behaviors. Observation assessed whether certain types of behaviors created an occasion for the teacher to respond more than others.

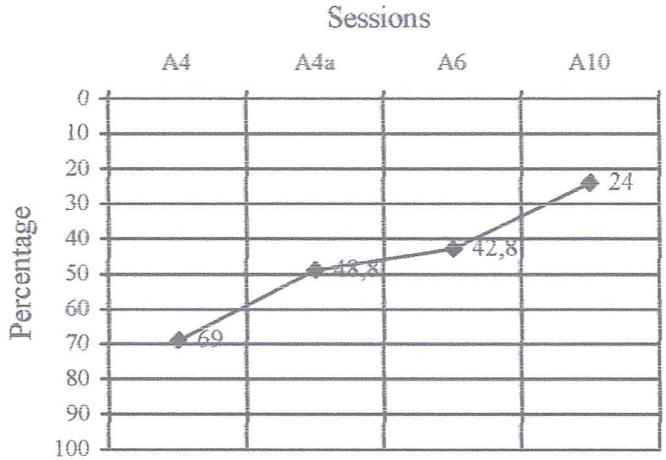
The types of child's initiations that the teacher more often responds to are: *misbehaviors* (such as putting foam in her mouth), *behaviors that do not match the activity* (such as smashing paper when she should be gluing it) or *a behavior that teacher expects Anna to perform* (using glue on paper). Teacher's responses aim at stopping or encouraging the behavior.

Although participant observations had shown that the teacher responded when Anna makes a sound, there were nearly no sounds produced during systematic observations, exception made in A4 (foam playing), when Anna coughs. The teacher did not respond to this sound.

Missed opportunities for communication

The ability to detect and respond to potentially communicative behaviors provides an interactive basis that supports the development of further communicative abilities. Missed opportunities for communication were assessed by counting the number of potentially communicative acts that were not responded to by the teacher.

Table 21 - Anna - Missed Opportunities for Communication



A4 - foam playing; A4A - hand washing; A6 - paper gluing; A10 - music

The activity that shows a larger number of non-responded behaviors is A4 (foam playing). During this activity the teacher is far from Anna and does not interact with her often. Most of Anna's behaviors in this sessions are not taken into consideration as potential initiations, and therefore do not create ground for interactions.

The activity that shows a smaller number of missed opportunities is A10 (music), which is the post intervention activity.

As mentioned before, data concerning missed opportunities for communication were selected both to describe interactions between teacher and child and also to compare results of pre and post intervention sessions, as it was the type of data that was less likely to be interfered by the nature of the sessions.

An amount of 67 potentially communicative acts were missed during the 35 minutes that represent total time of the three pre-intervention sessions: A4 (foam playing), A4A (hand washing), A6 (paper gluing). Based on these figures an amount of 1.91 missed opportunities per minute was calculated.

Considering the duration of the post intervention activity (13'), an amount of 24,8 non-responded behaviors in session A10 (music) was anticipated. The results of the post intervention session, for non-responded behaviors, indicate a number of 12 non-responded behaviors.

As the intervention procedure included information on ways to respond to child's potentially communicative behaviors, a conclusion can be made that there was a change in the way teachers responded to potentially communicative behaviors that points out to possible positive results of the intervention. These results will be further discussed in the next chapter, in association with results from the rating scale.

Summary of systematic observations of Anna

Anna displays potentially communicative forms such as smiling, changes in body position, vocalizations and movements. The results of behavior coding revealed six categories of behaviors: actions, response to being manipulated, attention, expressions, movements and sounds.

Although Anna does not show intentional communicative behaviors, she can ask for a movement to continue when she is involved in turn taking with the teacher.

Anna's teacher uses speech and speech combined with movement as main forms of communication with Anna. Her most frequent communicative functions are directives and provision of information. Whenever Anna shows behaviors that do not match an activity, misbehaviors, or behaviors that the teacher expects her to perform, the teacher responds to them with comments or directives.

The teacher misses opportunities for communication by not responding to Anna's behavioral forms. Results of the post intervention session show that the number of missed opportunities for communication decreased after intervention.

Maria

Activities observed and videotaped in Maria's case were sensory stimulation in the Snoozelan room (M6 and M7), and foam playing (M9 and M11).

Characteristics of videotaped sessions

Each activity had different characteristics. Table10 describes the characteristics of the four activities videotaped.

Sessions M6 and M7 are both located in the Snoozelan room. In Maria's weekly calendar the Snoozelan room appears three times. It is an activity that the school considers as important for children with multiple disabilities.

In session M6 and M7 (Snoozelan room) Maria and the teacher are in close contact. Maria lies on a waterbed. The teacher stands on the waterbed making it move, sits next to Maria or lies next to her. Different visual and hearing stimuli are provided under the teacher's selection. The teacher tries to get responses from Maria by changing stimuli. There is music and visual input from a light that reflects on a mirror surfaced ball hanging from the ceiling. The ball moves around producing visual stimuli that are seen around the room as moving spotlights of different colors. Stimuli can be selected to work isolated or in combination.

The teacher encourages Maria to interact by talking with her, making the waterbed bounce, tickling her and changing stimuli in the room.

Table 22 - Maria - Characteristics of Observed Activities

Session	Place	Activity	Anticipation cues	Goal	Outcome	Distance between teacher and child	Positioning	Contact between teacher and child
M6	Snoozelan Room	Maria and the teacher play on the waterbed	Verbal Moving into the Snoozelan room	Sensory Stimulation	No	No distance. Teacher and child are in close contact	Maria lies on the bed. The teacher either lies next to her or stands	Tactile hearing
M7	Snoozelan Room	Maria and the teacher play on the waterbed	Verbal Moving into the Snoozelan room	Sensory Stimulation	No	No distance. Teacher and child are in close contact	Maria lies on the bed. The teacher either lies next to her or stands	Tactile hearing
M9	Classroom	Playing with foam in a sink	Verbal Positioning on a wedge	Sensory Stimulation	No	> 1 meter	Teacher is behind Maria	Hearing Occasionally tactile
M11	Classroom	Playing with foam on the wheelchair tray	Verbal Object cue	Sensory Stimulation	No	40 - 50 cm	Maria is on her wheelchair. The teacher sits next to her, on her right hand side	Tactile hearing

M6 and M7 - Snoozelan; M9 - foam playing in group; M11 foam playing one on one

Maria is verbally informed they are going to the Snoozelan room. The teacher takes Maria out of her wheelchair and carries her to the room because there are wheelchair access problems to the room. This might help Maria anticipate where she goes as all other activities (occupational therapy, physiotherapy, speech and language therapy, lunch, toilet, playground) are in wheelchair accessible places and therefore Maria is taken there on her wheelchair. So, although the teacher provides verbal information only, there is more information that may support verbal information and help Maria anticipate. It is not clear if she anticipates the situation or if she just reacts to being taken out of the wheelchair, Observation showed that she also smiles when taken out of the wheelchair to go play on the floor.

The Snoozelan room provides sensory stimulation. Still observations led the researcher to think that Maria benefits more form the interaction created with the teacher than from the stimulation itself. The teacher presents different stimuli and waits for Maria's responses. Maria seems to react to light and sound by smiling. Her responses to movement are far clearer than her responses to sound and light. In session M7 she laughs a lot when the teacher moves the waterbed.

None of the activities has a clear outcome, or "finish" clue. The activity ends when the teacher says, " Let's stop. We are going back to our room". Again, changes in activities and environment are not clearly explained through the use of concrete forms of communication. Maria can only guess what is going on from combinations of speech, movement and, possibly, memory of previous situations. The teacher does not consistently use combinations of forms to inform Maria.

Although both activities happen in the same environment and with the same stimuli, interactions generated between Maria and her teacher is very different. Session M7 revealed

more interaction turns, more activity on Maria's side, more responses of the teacher than session M6. The activity seems to please both Maria and the teacher more in M7 than in M6.

In session M9 (foam playing group activity), Maria lies on a wedge. She is in front of a table with a sink where the teacher put foam Another learner plays next to her, also playing with foam. The teacher anticipates the activity verbally. Again, Maria might get an anticipatory clue from positioning. The goal of the activity is sensory stimulation through playing with foam.

The teacher moves around the classroom, paying attention to other children. Occasionally she comes close to Maria and interacts with her. The teacher's contact with Maria is tactile and verbal. She praises Maria, comments on her playing with foam, and helps her either with hand over hand support or by correcting her positioning so that Maria can reach out for foam. Maria smiles, she seems very happy displaying a lot of head movements. She also moves her arm and hand in the foam container. On occasions she moved her hand apparently trying to reach her peer's container.

Particularly in activity M9 (foam playing group activity) it was extremely difficult to sort out which movements were clearly voluntary movements. After discussion with a Cerebral Palsy specialist agreement was reached upon which behaviors were to be considered voluntary and therefore coded.

In M11 (foam playing one on one activity) Maria is on her wheelchair. The teacher sits next to her, on her right side, near Maria's right arm, in which she has some voluntary movements. The activity is playing with foam and the goal is again sensory stimulation. The teacher anticipates the activity by letting Maria feel the foam container.

In the initial part of the session Maria does not show great interest in the activity. The teacher mentioned that she had been crying often on that day.

The teacher started interacting with Maria by creating empathy that turned the interaction into an enjoyable one. The teacher spent time talking to Maria, slowly moving Maria's hand on the foam can, using speech and saying " now we are going to play with foam, look here is the foam… we are going to play…here is the foam can… and the foam… (lets her feel the container and a bit of foam in her hand). When she noticed a smile on Maria's face the teacher repeated the movement that made Maria smile. Maria smiled again. The teacher went on, attentively looking for Maria's expressions and involving her more and more in interaction through the use of a rhythmical sequence of movements and speech. This was a good example of the teacher's trying to interpret behaviors and responding to it in such a way that Maria ended up motivated to interact.

Observations of sessions M9 (foam playing group activity) and M11 (foam playing one on one activity) showed, much as activities M6 and M7 in the Snoozelan room, that the emotional interaction developed in these sessions ends up being the most important aspect of the activity. Although sessions M9 (foam playing group activity) and M11 (foam playing one on one activity) both share the fact that objects are introduced into the interaction, there is no progress in the development of interactions based on objects that could provide for learning opportunities.

This is consistent with statements of Maria's teacher in the final interview. She said that if she was to work with Maria on the following year she would not just concentrate on emotional interaction, somehow assuming this to be the core of her work during the year that our observations lasted.

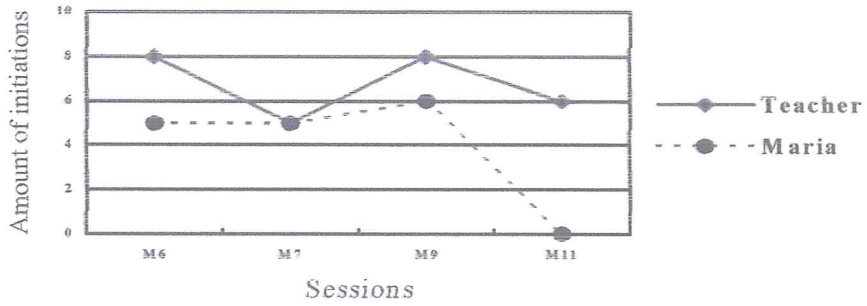
Initiations

As mentioned in the description of Anna's results, initiations are behaviors that start a communicative act, independent of intentionality.

Table 23 shows the number of initiations of both Maria and her teacher. The teacher shows more initiations in sessions M6, M9 and M11 (foam playing one on one activity), whereas in session M7 the number is equal for both teacher and child.

The apparent decrease of interactions along sessions is, in fact, the result of longer interactions happening between teacher and child, creating less pauses and therefore less need to re-start an interaction. In the next chapter these results will be discussed in combination with results of turn taking interactions.

Table 23 - Maria - Initiations of Teacher and Child



M6 and M7 - Snoozelan; M9 - foam playing in group; M11 foam playing one on one

Turn taking interactions

The frequency of interactions between Maria and the teacher and the number of turns of each interaction are displayed in Tables 24a+b.

Table 24a - Maria - Teacher Initiated Interactions and Number of Turns

Number of turns	Session M6 (25 min)	Session M7 (20 min)	Session M9 (11 min)	Session M11 (30 min)	Total
1	2	1	5	0	8
2-5	5	2	2	2	11
6-10	0	1	1	1	3
>10	1	1	0	3	5
Total	8	5	8	6	27

Table 24b - Maria - Child Initiated Interactions and Number of Turns

Number of turns	Session M6 (25 min)	Session M7 (20 min)	Session M9 (11 min)	Session M11 (30 min)	Total
1	1	1	0	0	2
2-5	3	0	3	0	6
6-10	0	2	3	0	5
>10	1	2	0	0	3
Total	5	5	6	0	16

Frequency of Interactions

The number of interactions between Maria and her teacher varies between 14 (six are child initiated and eight are teacher initiated interactions) in session M9 (foam playing group activity) to six in session M11 (foam playing one on one activity).

Table 25 -Maria - Frequencies of Interactions in Each Session

	Session	Duration	Nº of interactions
Pre intervention sessions	M6	25'	13
	M7	20'	10
	M9	11'	14
Post intervention session	M11	30'	6

Apparently there is a reduction of interactions in session M11 (foam playing one on one activity), which is the post intervention session. Still, an analysis of data concerning the number of interactions together with the number of turns in each interaction reveals that there is an increase in the length of each interaction, which somehow explains the reduction of the number of interactions along the session. Teacher and child keep themselves involved in ongoing interactions, which somehow also explains the lack of initiations described in the description of initiations.

It is interesting to note that judges' opinion, based on the Likert-type rating scale used to assess communicative interactions at the end of the process, does not confirm these results. Discussion of such results will be included in the next chapter.

Amount of Turns in Interactions

Length of interactions between Maria and her teacher varies according to each session. The most typical pattern is interactions of two to five turns. The longest interactions occur in sessions M7, with an interaction of 34 turns, and M11 (foam playing one on one activity), where there was one interaction with a total of 92 turns.

Maria and her teacher get involved in longer interactions in sessions M7 and M11 (foam playing one on one activity) which could be explained by the following factors: a) teacher and child got to know each other better along the year. Observation and interviews showed that the teacher felt much more comfortable interacting with Maria at the end of the year, b) the way teacher and Maria influenced each other along the sessions. In M7 Maria is very active and willing to move, and the teacher responds to her activity creating turn taking interactions during which Maria "asks" the teacher to re-start a movement of the waterbed by jumping on it. The teacher pretends to finish the session, while in fact she keeps an intonation that encourages Maria to keep trying to get the teacher to move the waterbed again.

A similar situation happens in session M11 (foam playing one on one activity), but in this session it is the teacher that ends up "convincing" Maria to interact. Maria is very quiet in the beginning of the session and looks quite uninterested in the interaction. As the teacher keeps on trying to encourage her to interact Maria gets more and more involved in the interaction. At some point Maria clearly smiles in response to the teacher's attempts to start interaction. The teacher picks up this response and develops a long turn-taking interaction consisting of playing with movement, speech and pauses that encourage Maria to participate. This happens after a long period of no responses from Maria's, and it is an interesting example of the way teachers should encourage learners to participate.

In all sessions interactions are basically of an emotional kind. There is no outcome for the activity; the teacher is not trying to teach Maria anything. Interactions are supported by the pleasure that both Maria and the teacher get form it. There is no development of any subject, no curiosity needs met, no introduction of a theme, no comments on life happenings, nothing that could help Maria explore and learn something. Responses are only time ruled, and not content ruled, as there is not a content to respond to.

Behavior forms and functions

Similarly to the description of Anna's behaviors results concerning Maria and her teacher's behaviors will be described based on percentages of behaviors and on categories of behaviors generated from content analysis.

Participant observation showed that Maria uses smiling, laughing, crying, changes in muscle tone and movements of her head and right hand.

Systematic analysis based on videotape records provided a deeper insight of Maria's potentially communicative behaviors. Results are described taking into consideration the nature of the activities.

Maria's Communicative Forms

Table 26 displays coding and categorization of Maria's communicative forms. Three categories of behaviors were found: 1) facial expressions, 2) body movements and 3) sounds. The category Sounds included vocalizations and vegetative sounds.

Vocalizations were not included in an identified category as the nature of these vocalizations was not clear. Maria does not vocalize often (a total of 23 vocalizations during the four videotaped observations), probably due to her spastic nature, which created some difficulties to the analysis. Analysis did not conclude about the nature of vocalizations. These could be either non-voluntary voice productions or controlled voice productions with a specific purpose.

Table 26 - Maria - Behavior Coding and Categorization

Category	Code Name	Code	Behavior description	Example
Facial Expression	Eye movement	EFMO	Any movement of the eyes that seems related to the context	Blinks
	Smile	EFS		Smiles
	Laugh	EFR		Laughs
	Face movement	EFMF	Any movement of the face that seems related to the context	
	Change in expression	EFALT	Any change in facial expression that seems related to the context	Suddenly becomes serious when laughing
Movement	Body movement	MC	Any voluntary body movement	Jumps on the waterbed
	Arm movement	MB	Any voluntary arm movement	Directs her arm towards a stimuli
	Move away	MAF	Any movement that represents moving away from a stimuli	Moves her face away from the teacher`s face
	Head position	MPC	Any change in head position	Raises her head
	Stop movement	PM	Any stop of initiated movement	When moving, suddenly stops movement after a stimuli
Other	Vocalization	VOC	Any vocal sound	"Aaaaa"
	Vegetative	V		Coughs, sneezes

Observations across sessions showed that Maria displays different behaviors according to the activity. Table 27 shows percentages of the types of behaviors that occurred more often in each session.

Table 27 - Maria - Behavior Percentages Across Sessions

	M6	M7	M9	M11
Eye movement	8%	3%	4%	11%
Smile	22%	13%	11%	19%
Face movement	2%		3%	
Laugh	2%	7%	11%	30%
Change in expression				4%
Body movement		26%	3%	6%
Arm movement	12%	8%	15%	8%
Move away				1%
Head position	30%	22%	41%	7%
Stop movement	10%	13%	8%	4%
Vocalization	6%	8%	4%	9%
Vegetative	8%			1%
Total	100%	100%	100%	100%

M6 and M7 - Snoozelan; M9 foam activity in group; M11 - foam activity one on one.

The largest amount of behaviors across sessions is head movements. In all but session M11 (foam playing one on one activity) Maria displays a lot of head movements. It should be noted that in M11 (foam playing one on one activity) Maria sits on her wheelchair and the teacher is in a fixed position, which leads to anticipating less head movement. Maria does not need to orient her head according to the sound.

Behavior percentages were analyzed together with 1) Maria's positioning in each session and 2) the nature of the activity. In both M6 and M7, both in the Snoozelan room Maria is laying on the waterbed. M6 shows movements of her head and smiles as the largest number of behaviors, whereas in M7 there is a lot of head and body movements.

In M9 (foam playing group activity) she is on the wedge with arms stretched forward and a container with foam that in which she can move her hands. In this activity Maria

moves her arm around the foam container and out of it. The movement of taking her arm out of her container was carefully analyzed, as it was not clear it was a purposeful movement. Apparently she was trying to reach out for a peer. As the teacher did not respond to the movement it was hard to decide on movement's communicative function.

In M11 (foam playing one on one activity) Maria is in her wheelchair. She displays very few movements. The largest percentage of behaviors displayed is smiles and laughs. The largest percentage of behaviors in M6, M7 and M9 (foam playing group activity) are movements.

Positioning should be questioned here. In M6 and M7 (both in the Snoozelan room) Maria lies on the waterbed her positioning is not very correct considering her motor problems. Still, she is free; her body touches the waterbed that she can move by herself. Observation showed her using body movements to initiate interaction. In M9 (foam playing group activity) she has a table in front of her with materials to touch and an opportunity to use her arms. Again Maria used a lot of movements. When she sits on her wheelchair she frequently does not have materials to act upon.

Analysis should also take into consideration Maria's vision problems. She cannot see and she only reacts to light and shadow. When she sits on her wheelchair she has little way to control what is going on. Hearing, in the absence of other stimuli or the ability to move, is not enough to understand what happens around her.

It is possible that a correct positioning that only looks at motor issues in the absence of accessible materials such as switches or functional objects does not permit Maria to act on the environment. Participant observations showed that when she was in her wheelchair with a hand switch to control a tape recorder she did her best to use her arm to switch it on. Most of the observation time Maria had no materials available to her so she could not use her hands to explore and control the environment.

Maria's Communicative Functions

The teacher often implies intentionality to Maria's behaviors using her own words to express what she thinks Maria is trying to say. The functions the teacher implies to Maria's behaviors are: 1) *comments*, such as in session M9 (foam playing group activity) when Maria smiles after feeling foam in her hand the teacher replies as if she was Maria " that feels good!" 2) *requests*, such as in session A when Maria starts to move the waterbed with body movements and the teacher says" do you want to playing?" and started bouncing the waterbed strongly; and 3) *questions* such as in M6 (Snoozelan room)when the teacher, after having started visual stimuli responds to Maria's head movement by saying "what is this? Lots of light?" Although some behaviors could be interpreted as refusals, such as in M11 (foam playing one on one activity) when Maria moves her head away from the teacher, the teacher did not imply intentionality into the behaviors.

Participant observations showed the teacher responding to *refusals*. When exploring together a touch book, the teacher seized Maria's movements and said " Oh! You don't want to work?" The teacher's implying intentionality was mostly done through verbalizing what she thinks Maria wants to express. Although correctly interpreting Maria's refusal the teacher did not respond Maria's function of refusal. For example, during the session in which Maria expressed refusal to go on with book exploration, the teacher the teacher acknowledge the refusal but went on exploring the book. It is, however, important to note that the teacher implies intentionality to Maria's behaviors assigning functions to Maria's forms. It was a way to start interaction. Because the teacher's response did not match Maria's functions Maria did not understand that her message had any meaning.

Maria's Teacher Communicative Forms

Behaviors of Maria's teacher were coded according to a list displayed in Appendix G. In Table 28 Percentage of forms more often displayed by the teacher across sessions are shown.

Table 28 - Maria's Teacher Behavior Forms

	V	M	V+M	PM	AcO	IM	MEC	V+OBJ	V-M
M6	36%	29%		5%	7%	8%	15%		
M7	35%	21%	21%	1%	15%		7%		
M9	60%	26%	12%				2%		
M11	13%	6%	63%		3%			14%	1%

V-verbal; M- motor; MM- hand over hand; O- object; VND -nondirected to the child

The teacher uses speech to communicate with Maria in all sessions. Teacher's use of speech is higher in M9 (foam playing group activity), during which she often moves away from Maria. The teacher tried to maintain contact with Maria by using a lot of speech.

The teacher used a large percentage of speech and movement behaviors in session M11 (foam playing one on one activity), clearly related to the type of activity, which is in itself required a sequenced combination of movement and speech. The post intervention session M11 (foam playing one on one activity) also shows the teacher using for the first time objects together with speech (The teacher lets Maria feel the foam container, then lets her feel the foam on her hand before starting the activity).

Maria's Teacher Communicative Functions

The teacher's most frequent functions vary according to each session. In Table 29 display a summary of the communicative functions more often used by the teacher is displayed. The code list used to code the teacher's functions is in Appendix H.

Table 29 - Maria's Teacher Behavior Functions

	P	CA	INF	C	FA	AA	ROT	I	CVPD	PR	EC	INC	O	N
M6	5		3	8	6	6		1	2	11	10			
M7	7		5	18	8	2			5	28	7	4	5	4
M9		5	2	15	2			1	6			3		
M11	10	10	20	9	3	1	59	4	1					

P -question; CA -directs attention; INF-informs C-comments; FA-facilitates action; I-imitates the child; PR-searches for a response-; INC-prompts; O- commands

In session M6 (Snoozelan room) there are *searches for responses* (PR) followed by *expressions of affection* (EC) and *comments* (C). In session M7 there are also *comments* and *search for responses* (PR).

In M9 (foam playing group activity) there were *comments* (C) and *playing double part* (CVDP). This probably relates to the relative positioning of teacher and learner. The teacher is not in close contact with Maria, and she tried to keep contact through the use of speech by either commenting on what is going on or using speech to express what she thinks Maria wants to say.

The highest number of functions shown in Table 18 refers to the performing of a routine, in M11 (foam playing one on one activity) (ROT -59), which is directly related to the nature of the activity that requires a sequential series of movements and speech to be performed. These behaviors were included in a category called *Routines*.

Apart from Routines, which is a function that is totally depending on the activity, the teacher's most frequent functions across the observed sessions are *comments* and *searches for response.*

Again it should be noted that, most as in Anna's case, this analysis did not include a study of the forms used in the expressed functions. This might provide for more information on the consequences of its use in Maria's receptive communication. Still the time available for this study made impossible this type of analysis.

Behaviors more often responded to by the teacher

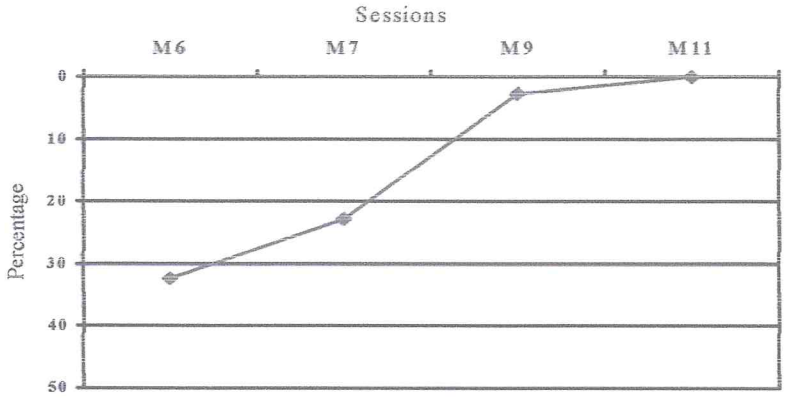
The teacher responds to Maria's *vocalizations* and *cry*. *Movements* of the whole body are also responded to, although they usually occur together with either vocalizations or cry. More subtle movements, such as arm or hand movements are not responded as consistently.

Some of these movements, due to Maria's severe motor problems, are difficult to analyze. Still, both in participant observations and video analysis of systematic observations showed arm and hand movements that were not responded to by the teacher. In the final coding of Maria's behaviors both what could be hand movements or arm movements ended up being coded in just one category. Maria has very little dissociation abilities and it was just not possible to figure out if she was trying to move her hand and ended up moving her arm, or if she was using an arm movement to direct her hand to something because of her inability to dissociate hand movements.

Missed opportunities for communication

Maria's behaviors are often attended and responded to by the teacher. Observation showed that the teacher progressively responded to more behaviors. In sessions M9 (foam playing group activity) there was a percentage of 2,7 behaviors that were not responded to by the teacher and in Session M11 there were no identified missed opportunities (Table 30). It should be noted, however, that the duration of activity M9 (foam playing group activity) is 11 minutes, whereas for the two other activities time ranges between 20 and 30 minutes. This might account for the reduction of non-responded behaviors in session M9 (foam playing group activity).

Table 30 - Maria - Missed Opportunities for Communication



Based on the three pre-intervention sessions the expected number of missed opportunities per minute was calculated, in order to compare pre and pos intervention results.

From a total of 32 non responded behaviors across the 56 minutes that represent the total time of the pre intervention sessions, an amount of 0.57 missed opportunities per minute was calculated. Using this figure, an expected number of 9.77 missed opportunities for the post intervention session was obtained. The observed number of missed opportunities in the post intervention sessions is zero. This leads to the conclusion that there are differences between pre and post intervention sessions in the teacher's responding to child's potentially communicative acts. Still, it should be noted that the nature of the activity (with a strong rhythmical component) and the way it was developed by the teacher (actively searching for Maria's responses) somehow created natural opportunities for Maria's responses to be picked up by the teacher.

Summary of systematic observations of Maria

Maria's communicative forms were coded in three categories: facial expressions, body movements and sounds (e.g., vocalizations and vegetative sounds). The teacher implies intentionality to Maria's behaviors identifying communicative functions such as requests, comments, refusals and questions.

Maria's teacher uses speech to communicate with Maria. Her more frequent communicative functions are comments, and searches for response.

Maria's behaviors that are more frequently responded to by the teacher are vocalizations, crying and movements of the whole body.

A decrease of missed opportunities for communication was noticed across sessions. In session M11 (foam playing one on one activity), the post intervention session, there were no identified missed opportunities related to responding to Maria's behaviors.

Systematic observations provided in-depth information concerning the communication between teachers and children, as well as data that supported the assessment of the intervention process. In the next section data results of initial and final interviews with the teachers will be presented.

Interviews

Two interviews with each teacher were conducted, one before and one after intervention. Results will be presented separately according to each case.

Results of the initial and final interviews are displayed in matrices that help compare responses and draw conclusions. These matrices are in Appendix I.

Interviews revealed information on 1) child's characteristics, 2) communication, 3) teacher's former training, 4) teacher's former experience in Special Education, 5) teacher's work with the specific child, 6) teacher's professional expectations in this position 7) teacher's opinion about the intervention procedure and, 8) support that teachers get from school.

Anna's teacher

Anna's teacher is a preschool teacher with no previous experience in working with children with multiple disabilities. She does not have training in Special Education, but has had some experience with children with special needs in inclusive settings. In service

training related to the education of children with multiple disabilities is not provided by the school to new coming teachers.

During the initial interview Anna's teacher mentions that it is very frustrating to work with Anna because Anna does not respond and does not interact with people. People are also not very attracted to her because she drools, smells bad and is often not well taken care of.

The teacher thinks that Anna has very limited interests. Anna's only initiation is picking up play dough in the shelf, as she likes to keep a piece in her hands.

Although Anna does not respond to other people's initiations, the teacher thinks that this is because Anna does not want to answer, as "she can understand oral language". Anna's teacher statements about Anna's speech comprehension are inconsistent. She points out that Anna does not show signs of understanding people talking to her, that it is difficult to know what she likes or wants, that her responses are inconsistent and, altogether, that she does not communicate. As the researcher tried to understand what she meant by inconsistent responses, the teacher described situations in which Anna suddenly responded when she was not expecting her to.

Teacher -" I was about to put her gloves on, we go out, and I said to her "give me your hand" and she put her hand forward!"

Interviewer - did you have the gloves in your hand?

Teacher -Yes

Interviewer -"Did you have your hand put forward, when you said that?"

Teacher - "I might yes, I think I might have. I am not sure."

The use of objects in context apparently increases Anna's understanding. This is consistent with informal information from the teacher aide who said that Anna goes to the

bathroom when given a piece of toilet paper. Still, observations showed that this is not noticed and valued as an important clue to communicate with Anna.

When asked how does Anna make herself understood, the teacher mentions that Anna often cries without apparent reason, refuses to do some activities, throws things on to the floor when she does not want to do something and, in general, "can express herself when she does not like something". This information contradicts Anna teacher's statement about Anna not communicating, but apparently the teacher is not aware of that contradiction.

The teacher points out, once again, that Anna's responses are very inconsistent, making it very hard to figure out what to do with her. There is only one thing Anna is consistent about, which is getting play dough from the closet. It is her only initiative.

When asked how she organizes her work with Anna the teacher said that it is hard to get her to do anything because she uses a body jacket that does not allow her much free movement. The teacher thinks that she should insist on autonomy skills, such as toilet training, but it is hard to combine a toilet training schedule with all other activities that Anna has outside the classroom. The teacher thinks she autonomy his the first priority in working with these learners, although she considers outside activities such as swimming an horse back riding as very important too.

Anna's teacher considers the possibility of working with these children in the future. She says it is too early to make decisions on that, but she likes this job, and might like to go on next year. Referring to the lack of information about learners with multiple disabilities the teacher mentions her need for more information; some training that gives her strategies to communicate and develop plans to work with learners like Anna.

The final interview collected data on the effects of one-year work with Anna, and also on the teacher's opinion about the intervention procedure.

The teacher thinks that Anna has not changed much during the year. She keeps showing inconsistent responses and her behaviors change from day to day. Anna's teacher stresses this point several times throughout the interview, as Anna's most important characteristic:

> There are days in which she laughs and is very funny, even threatening us with inappropriate gestures; other days she just stays there, absent.

Asked about Anna's educational needs, the teacher states that she should have paid more attention to Anna. Anna needs one on one attention to be able to do anything, although I think Anna should not get it all the time. As for the type of activities, she mentions music and story time as important, together with more time spent in toilet training.

Her experience as a teacher of children with multiple disabilities was a difficult one. Still, had it not been for the fact that she really has to leave school, she might consider continuing teaching these children. She thinks of this year's experience as a positive one and would not mind trying it again for another year, building on the experience of this year. If so, she would like to have another teacher aide and work closer with the Speech Language Therapist to have more clues on what to do with Anna.

When asked about her opinion concerning our stay in the classroom, Anna's teacher said she felt uneasy in the beginning, but ended up liking it. Referring to the intervention procedure she says: "she (Anna) didn't really change much in terms of communication, but at least the results served your goals, right?" It was clear that the teacher viewed the researcher's presence in the classroom as something that would eventually benefit the study, but did not consider it as something that might benefit her own work and ultimately Anna's performance.

Maria's teacher

Maria's teacher is a preschool teacher with no formal training in special education and no experience in the area of multiple disabilities. Her former jobs included some experiences in inclusive settings. Children with special needs in those settings had less severe problems. She did not get any previous information in issues related to education of children with multiple disabilities.

In the initial interview the teacher stressed that she thinks this type of work is "not compensating." She thinks that teachers should not stay in this kind of job for too long because children have limited success, which causes work to be frustrating.

One of the main interests was the way Maria and her teacher communicate. The teacher points out that Maria "makes herself understood" and that her main communication forms are smiles, vocalizations and general movements. Maria can express pleasure, attention and displeasure and pays a lot of attention to people speaking.

When asked how she would describe Maria, the teacher said, "She is very easy… she is always happy and very easy to please".

She is quite sure Maria does not understand speech alone, but can anticipate routines such as meal times, probably relying on clues such as time, smell, place, and possibly some speech associated.

Maria is provided with a head switch that she uses to activate a tape recorder. She used it during an activity included in participant observation. The head switch broke and Maria was encouraged to use a table switch but the teacher thinks it is too hard for her to activate it due to her motor problems. Actually she is often left without any switch at all.

Teacher's work with Maria concentrates on sensory and motor goals. The teacher thinks Maria benefits from being in contact with soft and warm materials, and that she needs to use more of her arms. In her planning the teacher felt it difficult to plan for activities

because of the severeness of Maria's motor problems, which make her rely on hand over hand support to be able to perform any motor activity. The teacher regrets not having more support from professionals in school, as she thinks it is "impossible for people to find the right answers all by themselves."

Contacts with the family are kept through a book where both the teacher and the parents write daily, describing Maria's experiences, needs and problems. Although the family does not often come to school, they participate in everything the school asks them to.

Researcher's impression throughout the interview was that the teacher was not very comfortable talking about Maria. She gave very short responses and had to be prompted with probes so that she would go on talking about Maria.

During the final interview, which was carried out after intervention, it was clear that the teacher had learned to understand a lot about Maria. The teacher seemed very comfortable with our talking about Maria and in fact seemed to enjoy talking about the child.

She pointed out that Maria has problems anticipating from tactile information but she can do better if tactile information is combined with other kinds of information, like speech or routines. She believes Maria is able to understand objects when related to routines, such as knowing that a spoon belongs to eating time. She questions Maria's cognitive functioning but relates her poor performance to the lack of visual information. She thinks that the lack of vision makes comprehension difficult and causes her to take longer to respond.

Maria's abilities to understand verbal input are still not clear to the teacher. Apparently Maria can identify names but, apart from that, most of what she understands seems to come from routines and not exactly from speech alone.

Although she had a warm welcome at the school, the teacher regrets that there is no cooperative work between classroom teachers and the therapy professionals (Occupational Therapy, Physiotherapy and Speech Language Therapy), which caused her to have some

difficulties in the beginning. Again she stressed how important it would have been for her to have other professionals help her with planning in the beginning of the year. So the intervention process, although providing her with useful clues for her work with Maria, was late, as "it should have happened in the beginning of the school year" to help her design a more structured intervention for Maria.

The teacher thinks that suggestions on the use of touch cues, objects or reference and calendars as useful strategies that she would like to work on in the future, had she decided to keep her job in that school. Instead of working on the emotional interaction only, which was mostly what she did throughout the year, she would concentrate on structuring and providing clues for Maria. By doing so the teacher believes she could put more demands on Maria's responding and therefore teach her more. The information provided during the intervention gave her " a reason to work with Maria" and ideas about what to do.

The final impression after this interview and from former interactions between researcher and teacher during the intervention was that the teacher had in fact understood the essential questions about Maria's education.

Interviews provided information concerning teachers, their involvement in the process of teaching children with multiple disabilities, their needs and expectations about the children in this study, and their views of the intervention process.

These data will be used in the discussion of participant and systematic observation results, as well as in the discussions of some of the results of the Likert-type rating scale.

Likert Type Scale

The Likert-type presented the following statements to raters: 1) The activity helps facilitate interactions, 2) The teacher incorporates turn taking into the activity, 3) The child initiates communication, 4) The teacher responds to the child's initiations, 5) The activity is enjoyable and motivating for the child, 6) The teacher interprets child's behaviors as

communicative. 7) The teacher paces interaction according to the child's needs, 8) The teacher misses opportunities for communication and, 9) The teacher develops interactions that provide opportunities for learning.

Results of the Likert type rating scale were described through the use of modal values for each item and session. Table 31 shows modal values for each session and item.

Modal values of each pre intervention session were compared with the post intervention session to assess the intervention procedure. Graphics comparing modal values of each pre intervention session with modal values of the post intervention session are shown in Appendix J.

Table 31 - Modal Values for Both Cases

Anna					Maria				
	Pre-intervention			Post-interv.		Pre-intervention			Post-interv
	A4	A4A	A6	A10		M6	M7	M9	M11
FDI	4	4	4	4	FDI	4	4	2	4
IAT	1	2	2	3	IAT	2	3	2	3
CIC	2	4	2	4	CIC	4	4	3	4
RIC	2	3	2	2	RIC	2	4	2	3
AAM	4	4	2	2	AAM	3	4	3	3
ICC	2	4	2	3	ICC	2	4	2	2
RRF	2	2	2	1	RRF	2	3	2	2
POI	1	2	1	2	POI	2	2	2	2
IPA	1	2	2	2	IPA	2	3	2	3

FDI-Activity facilitates Interactions; LAT-Teacher includes turn-taking; CIC-Child initiates communication;
RIC-Teacher responds to child initiation; AAM-Enjoyable and motivating activity; ICC-Teacher interprets child's behavior as communicative; RRF-Teacher paces interaction; POI-Teacher misses opportunities for interaction; IPA-Interaction provides opportunity for learning

Distribution of responses was tested through the use of the Kolmogorov-Smirnov goodness of fit test in order to determine agreement among judges. D values and significance levels for item and session are shown in tables 32 and 33.

Although according to results of systematic observation, changes were noticed in both teacher and child's behaviors, these changes did not provide for an increase of the quality of interactions as shown by Likert-type scale results. These findings will be discussed in the next chapter together with data resulting from participant observations and systematic observations.

Still, an analysis of the results of each session and item shows patterns that provide for a better understanding of teacher/child interactions and offers to the researcher some clues that should be used to implement the quality of communication interventions. Due to individual differences in the observed cases, findings for each case will be discussed separately.

Anna

Mode results of judges' responses are displayed in Table31. D-values and significance levels for sessions A4 (foam playing), A4A (hand washing), A6 (paper gluing) and A10 (music) are displayed in Table 32.

An analysis of mode values and significance levels for each item and session reveals that item POI *(The teacher misses opportunities for communication)*, item RRF (*The teacher paces interaction according to child's needs*) and item IPA (*interactions provide an opportunity for learning*) had a mode response of 2 exception made for session A10 (music) and item RRF (the *teacher paces interaction according to child's needs*) in which the mode value is 1. (item POI was reversed, as the direction was opposite in meaning to the other items). On the other hand, all judges agree (mode 4) that "*The activity helps facilitate interactions*" (item FDI) across sessions.

Significance levels of agreement show that results on items RFF *(teacher paces interaction according to child's needs*) and POI (the *teacher misses opportunities for communication*) are significant at .01 in all sessions. Results of item IPA (*interactions provide an opportunity for learning)* are significant at .01 in sessions A4 (foam playing) and A6 (paper gluing), and at .05 in sessions A4A (hand washing) and A10 (music).

Responses varied for item CIC (*The child initiates communication*). In session A4 (foam playing) and A6 (paper gluing) the mode is 2 whereas for sessions A4A (hand washing) and A10 (music) the mode is 4. Looking at the characteristics of activities one can see that A4A (hand washing) and A10 (music) are activities in which the learners is more involved, which might account for more initiations. Agreement among judges was not significant in this item.

Table 32 - Anna – D-Values Per Session and Item and Significance Levels

	A4	sig.	A4A	sig.	A6	sig.	A10	sig.
Activity facilitates interactions (FDA)	0,2		0,37	.01	0,122		0,331	.01
Teacher includes turn-taking (IAT)	0,408	.01	0,292	.05	0,446	.01	0,119	
Child initiates communication (CIC)	0,161		0,246		0,162		0,208	
Teacher responds to child initiation (RIC)	0,331	.01	0,285	.05	0,408	.01	0,361	.01
Enjoyable and motivating activity (AAM)	0,162		0,285	.05	0,446	.01	0,246	
Teacher interprets child's behavior as communicative (ICC)	0,446	.01	0,2		0,331	.01	0,324	.01
Teacher paces interaction (RRF)	0,485	.01	0,4	.01	0,524	.01	0,408	.01
Teacher misses opportunities for communication (POI)	0,485	.01	0,446	.01	0,485	.01	0,523	.01
Interaction provides opportunity for learning (IPA)	0,485	.01	0,285	.05	0,331	.01	0,284	.05

N= 26: critical values .05: 0,27; .01: 0,32

Item RIC (*The teacher responds to child's initiations*) shows a mode of 2 in all but session A4A (hand washing), in which the mode is 3, meaning that the teacher usually does not respond to the child's initiations. Significance levels for this item show that responses are

significant at .01 in sessionsA4 (foam playing), A6 (paper gluing) and A10 (music). The highest rating, in session A4A (hand washing), is significant only at .05.

Still, in item ICC (*The teacher interprets child's behavior as communicative*) judges' responses vary according to sessions. Judges "Disagree" in sessions A4 (foam playing) and A6 (paper gluing) (mode 2), "Agree" in session A4 (foam playing) (mode 4) and "Somehow agree" in session A10 (music) (mode 3). It is interesting to notice that sessions A4A (hand washing) and A10 (music) are also the ones that are rated as having more child's initiations (see responses in item CIC - *child initiates communication*). Apparently, when child's behaviors are identified as communicative the teacher responds to them. An analysis of D values reveals that results are significant for sessions A4 (foam playing), A6 (paper gluing) and A10 (music) at .01, and are not significant for session A4A (hand washing).

Turn taking as shown by item IAT (*The teacher incorporates turn taking into the activity*) is not consistently developed by the teacher according to observed sessions. Responses vary from a mode of 1 in session A4 (foam playing), to a mode of 2 in sessions A4A (hand washing) and A6 (paper gluing), and a mode of 3 in session A10 (music). Session A10 (music) was the more interactive session, during which the teacher asked Anna to imitate movements, which she responded to by imitating teacher's behaviors. This might account for the higher rating of turn taking in this session. Still, no significance level was found in results from session A10 (music). Results of sessions A4 (foam playing) and A6 (paper gluing) were significant at .01 and results of A4A (hand washing) were significant at .05

Judges' opinions on the level of *motivation provided by the activity* (item AAM) varies also. In sessions A4 (foam playing) and A4A (hand washing) judges "Agree" (mode 4) that the activity is motivating but they "Disagree" (mode 2) that activities in sessions A6 (paper gluing) and A10 (music) are motivating for the child. Again, it is interesting to note

that A10 (music), although providing for more opportunities for turn taking, and actually showing more child's initiations and child's responses is not considered as a very motivating activity. Results of sessions A4 (foam playing) and A10 (music) for item AAM *(enjoyable and motivating activity)* are not significant, but results of session A4A (hand washing) have a .05 significance level and A6 (paper gluing) has a .01 significance level.

Another interesting aspect is that activities A4 (foam playing) and A4A (hand washing) both show an opportunity for the child to freely explore at a sensory level, by using foam in session A4 (foam playing) and water in session A4A (hand washing). This might account for the level of motivation shown and provides information on the kind of activities that Anna likes.

Judges agree (mode 4) that the *activity facilitates interaction* (item FDI) in all sessions. Only results of sessions A4 A and A10 (music) are significant at .01 levels.

Pre and post intervention mode differences analyzed in conjunction with significance levels, revealed that differences found are based on results that do not always show significant levels of agreement and therefore intervention did not impact on interactions between teacher and Anna. Item ICC (teacher *interprets child's behavior as communicative*) and (*the teacher misses opportunities for communication)* shows differences based on significant levels if comparing A4 (foam playing) to A10 (music) and A6 (paper gluing) toA10 (music). Still in sessions A4A (hand washing) differences were not found for these items.

Item IAT (*teacher incorporates turn taking into the activity*) is the only one that consistently shows higher results in the post-intervention session (A10 (music)). Still, analysis of agreement among judges found that these results were not significant at any level, which decreases the relevance of such findings.

Summary of Anna's results

Results of the Likert-type rating scale used to assess interactions between Anna and her teacher reveal that the teacher misses opportunities for communication, does not provide for learning opportunities, does not pace interaction according to Anna's needs. Although agreement was found on responses related to the teacher not responding to Anna's initiations, judges' responses related to Anna initiating communication were not significant in any session, therefore leading to the conclusion, much as in participant and systematic observations, that Anna does not initiate communication.

Maria

Mode results of judges' responses are displayed in Table31. D-values and significance levels for all sessions and items are shown in Table 33.

Table 33 - Maria - D-Values Per Session and Item and Significance Levels

	M6	sig.	M7	sig.	M9	sig.	M11	sig.
Activity facilitates interactions (FDI)	0,2		0,418	.01	0,173		0,155	
Teacher includes turntaking (IAT)	0,4	.01	0,2		0,31	.05	0,309	.05
Child initiates communication (CIC)	0,15		0,464	.01	0,264		0,2	
Teacher responds to child initiation (RIC)	0,263		0,2		0,355	.05	0,309	.05
Enjoyable and motivating activity (AAM)	0,309	.05	0,464	.01	0,127		0,264	
Teacher interprets child's behavior as communicative (ICC)	0,309	.05	0,199		0,201		0,309	.05
Teacher paces interaction (RRF)	0,327	.05	0,264		0,372	.01	0,418	.01
Teacher misses opportunities for communication (POI)	0,509	.01	0,263		0,509	.01	0,418	.01
Interaction provides opportunity for learning (IPA)	0,418	.01	0,264		0,327	.01	0,401	.01

N= 22: critical values .05: 0,294; .01: 0,356

The most consistent result in Maria's case is *the missing of opportunities for communication that*. The mode across sessions (item POI was reversed, as the direction was opposite in meaning to the other items) is 2 and results are significant at .01 in sessions M6, M9 (foam playing group activity) and M11 (foam playing one on one activity).

Item RRF (*The teacher paces interaction according to child's needs*) there is a mode response of 2 in all but session M7 that shows a mode of 3. Results of sessions M6, M9 (foam playing group activity) and M11 (foam playing one on one activity) are significant at .01.Significance levels were not found in results from M7.

Judges' opinion on item IPA (*interactions provide an opportunity for learning*) show differences between sessions M6 (Snoozelan room) and M9 (foam playing group activity), in which mode is 2 and sessions M7 and M11 (foam playing one on one activity) which show a mode of 3. A significance level of .01 was found for results of M6, M9 (foam playing group activity) and M11 (foam playing one on one activity). Results of sessions M7 did not prove to be significant.

The *activity helped facilitate interactions* (FDI) in sessions M6, M7 (Snoozelan) and M11 (foam playing one on one activity), as the mode response was 4. Session M9 (foam playing group activity), during which Maria was laying on a prone position playing with foam and the teacher was not in close contact with her, had a mode response of 2 therefore indicating that the activity does not help develop interactions. Distance seems to play a role in the development of interactions, particularly so in Maria's case as she has visual impairments and probably depends on proximity for acknowledging partner's role in interaction. Significance results report that only the result of session M7 is significant.

Responses indicate that *the child initiates communication* (item CIC). There is a mode of 4 in sessions M6 and M7 (Snoozelan room) and a mode of 3 in sessions M9 (foam

playing group activity) and M11 (foam playing one on one activity). A significance level of .01 was found for results of session M7.

The teacher responds to child's initiations (RIC) in sessions M7 (mode 4) and M11 (foam playing one on one activity) (mode 3). In sessions M6 (Snoozelan room) and M9 (foam playing group activity) judges believe that the teacher does not respond to the child initiations (mode 2). Sessions' results of M9 (foam playing group activity) and M11 (foam playing one on one activity) are significant at .05.

Turn taking (item IAT), as analyzed by judges, is often not present in the videotaped activities. In M6 (Snoozelan room) and M9 (foam playing group activity) there is a mode of 2 and in sessions M7 and M11 the mode is 3. A level of .05 was found for significance of results of sessions M11. Other results of this item are not significant. Results of session M11 will also be analyzed taking into account data from the systematic observations, which showed an increase of turn taking opportunities in this session.

Except for session M7, in which there is agreement that *the activity is motivating for the child* (mode 4), judges only somehow agree that sessions M6 (Snoozelan), M9 (foam playing group activity) and M11 (foam playing one on one activity) are motivating (mode 3). Concerning item AAM (*enjoyable and motivating activity*) agreement was found among judges for session M6 (Snoozelan room) at .05 level and M7 (Snoozelan room) at .01 level.

It is interesting to note that the environment is the same in activities M6 and M7 (Snoozelan room), and the type of activities that the teacher develops is similar in both cases (teacher and child lay on the water mat, listen to music and play). In M7 there is more turn taking, more responses to child's initiations and more interpretations of child's behaviors as communicative than in M6, which might account for judges expressed opinions. M6 (Snoozelan room) was the first videotaped activity, and it occurred earlier in the school year. As mentioned before, the teacher was new in school and had no training in working with

children with multiple disabilities. This might explain different levels of empathy and closeness between teacher and child during the first videotaped activity.

Pre and post intervention mode differences analyzed in conjunction with significance levels revealed that differences found are altogether not significant and therefore intervention did not impact on interactions between teacher and Anna. A remark should be made about item IPA (*interactions provide an opportunity for learning*), which shows results in M11 (foam playing one on one activity) are significant and higher than in sessions M6 (Snoozelan room) and M9 (foam playing group activity).

Summary of Maria's results

Judges responses on items *(teacher paces interaction according to child's needs),* POI (*the teacher misses opportunities for communication)* and IPA (*interactions provide an opportunity for learning)* indicate that interactions between Maria and her teacher have significant problems related to pacing the interaction according to Maria's needs, seizing opportunities for communication and including learning opportunities into the interactions.

Analysis of differences between each pre intervention session's results and post intervention results inform that intervention did not impact on the quality of interactions between Maria and her teacher.

Results of both Anna and Maria's cases show that 1) missing opportunities for communication, 2) problems with pacing interactions according to the child's needs and, 3) developing interactions that do not provide for learning are the most salient characteristics of teacher/child interactions across sessions. It shows, also, that the intervention procedure that was carried out, although creating change in the way teachers respond to potentially communicative behaviors (see results of systematic observations) was not comprehensive in providing teachers with better interactive abilities.

These results indicate a need for an approach to interaction and communication that takes into account not just individual behaviors but also looks at interaction issues that include time and learning opportunities. Training in the area of communication for learners with multiple disabilities should therefore incorporate specific information aimed at influencing teachers' abilities in these areas.

A detailed discussion of results will be presented in the next chapter, which combines and discusses results of participant observations, systematic observations, interviews and the Likert-type rating scale.

DISCUSSION OF RESULTS

This study has two major outcomes. The first one is the description of communication interactions between two teacher/child dyads; the second is the result of an intervention procedure carried out with teachers. Discussions of results are based on the research questions that oriented this study:

1. What are the communicative forms and functions used by children?
2. What are the communicative forms and functions used by teachers?
3. How do teachers and learners engage in turn taking activities?
4. What communication behaviors do teachers respond to?
5. Why do teachers miss opportunities for communication?
6. What are teachers' expectations about communication with these children?
7. Do teachers miss fewer opportunities for communication after an intervention procedure?
8. Does intervention improve teacher's interactions with children with multiple disabilities?

The discussion pulls together results of both Anna and Maria's cases as a way to highlight similarities and contrast differences. A summary is presented at the end of the discussion of each research question with the exception of questions one and two that are summarized together. The decision to summarize the two questions together aims at facilitating an understanding of the characteristics of interactions in what forms and functions are concerned.

Answers to questions one to six relate to the communicative interactions of the two dyads. Answers to questions number seven (do teachers miss fewer opportunities for communication after an intervention procedure) and eight (does intervention improve

teacher's interactions with children with multiple disabilities) relate to the intervention process.

Different data collection and data generation methods were used in this study. In order to comprehensively analyze and discuss results, data was organized in a matrix that puts together results gathered from different data collection methods according to each research question. The matrix is included in Appendix K.

Because observations were concerned with children in school time activities, a summary of issues concerning contexts in which observations were carried out will be presented first. Such information helps integrate the discussion of findings.

Contexts

Two ten year old children were observed whose time in school is mostly filled with performing kindergarten activities and attending pull out services for Occupational Therapy, Physiotherapy and Speech and Language Therapy. Both children have multiple disabilities and do not speak. One child is ambulatory and the other one uses a wheelchair.

Learners spend most of their time in therapy services or in the classroom. With the exception of washing hands, activities observed are not functional and not age appropriate.

Teachers do not have training in multiple disabilities and observation showed that they do not view communication as a priority in children's educational programs.

Anna's teacher does not present a positive profile of Anna. She thinks working with her is frustrating because Anna does not attract attention and does not interact. Maria's teacher points out the need for training so that she can meet Maria's communicative needs adequately. Both teachers would like to have more support from other members of the team.

Although they do not speak or understand speech, both children have many pre-linguistic forms of communication that convey communicative functions. It is interesting to note that Anna, although ambulatory, is very passive, has a slow pace of processing

information and does not have social functions. One cannot help but wonder that Anna may be passive because people do not expect much of her and don't like to be near her.

With Maria, adults have a unique approach; they play the double part by giving words to Maria's pre-linguistic behaviors in a conversation. They give words to Maria's comments, requests and refusals. Although teachers' actions continue with their own agenda, their playing double part show that they are sensitive to Maria and consider her as a communicative partner.

School time activities aimed at preparing children for adult life are not considered in observed children's schedules. In addition to that, performed activities are not anticipated and have no clear outcome.

A question remains of what do children understand from such activities. In Anna's case, she might get some clues from observing the environment, but it is not clear how much she understands from that. Taking into consideration that Anna does not understand speech, which is the main way to convey information in class, she is left with no indication about what goes on and about what she is supposed to do.

Maria has limited access to information due to her motor and visual disabilities. Cues that might help her understand the environment such as developing anticipations with concrete information and routines are not used consistently to support information given through speech, leaving her with a fragmented picture of what goes on around her.

In both cases children are not provided with enough (organized) sensory information that compensates for their difficulties in assessing information. The information they get is fragmented because of 1) limitations related to sensory input, 2) limited opportunities for accessing experience, 3) lack of compensatory modes to access the environment, such as augmentative communication devices, or use of concrete information to assist communication and, 4) lack of environments in which they are individually assisted and

communicated with, in order to compensate for the lack of incidental access to information. This should mean one on one intervention that aims not just at facilitating contact with the world but also at assisting information processing, so that children can get as many organized and meaningful experiences as other children do.

A conclusion in both cases is that activities children perform in school are not functional and not age appropriate and therefore do not provide children with learning and communication opportunities. Another conclusion is that children are not provided with necessary assistance that supports access to the environment and encourages communication.

Discussion of Research Questions

Question #1: What are the communicative forms and functions used by children?

Analysis revealed that children's expressions are at a pre-linguistic level of communication in both cases. Anna responses increase when speech is augmented with objects and gestures. Observation showed that she cannot understand speech alone. Maria's teacher reports that Maria can benefit from the association of speech, tactile information and routines.

Anna does not show intentionality in her behaviors. Her ability to interact is, therefore, depending on the teacher's ability to respond and to imply intentionality to her behaviors, which does not occur in most cases.

Due to the lack of intentionality it was not possible to observe communicative functions used by Anna. It is possible to imply request and refusal functions into some of her behaviors but usually there was no response from the teacher acknowledging it.

Maria shows intentional behaviors although the array of available communication forms is limited by her motor disabilities. The teacher responds to Maria's behaviors frequently, although her responses are, often, just acknowledgments of Maria's behavior through verbal comments. The teacher verbalizes what she thinks Maria intends to express

through her behaviors, thus creating opportunities for Maria to develop her intentional behaviors. The functions that the teacher more often detects from Maria's behaviors are comments, refusals, questions and requests.

A question remains about Maria's ability to understand speech, which might decrease the effect of such strategy. Speech understanding at a linguistic level was not detected, although Maria showed signs of discrimination of people's voices and the teacher states that she discriminates people's names.

Question #2: What are the communicative forms and functions used by teachers?

In essence, there is a gap between the level of communicative forms teachers use and children's receptive communication level. An analysis of the communicative forms used by teachers shows that speech is the preferred communication form of both teachers, although there is no indication that children understand messages being conveyed through speech alone. Movement is often associated with speech in both cases as a natural form, most in the same way people usually combine movement with speech.

Strategies to increase understanding of spoken messages, particularly the combination of concrete communicative forms such as objects with speech, were not detected. Teachers' functions are mostly commands and provision of information in Anna's case, and comments and search for responses in Maria's case.

Summary of findings for questions one and two (what communicative forms and functions do teachers and children use): Considering that children do not understand speech alone, communication at a receptive level is fragmented due to the lack of concrete communication forms to augment speech used by both teachers. As a consequence, opportunities for interaction both at a social and at a learning level are endangered.

Both children communicate at a prelinguistic level. Maria's communicative forms are responded to by the teacher. Anna's forms are not looked as potential communication.

Concrete forms of communication, such as objects or touch are not used consistently to develop communication.

Information gathered about forms and functions used by both children and adults leads to the conclusion that in both cases communication needs are not met at this level therefore leaving the two children with little opportunities for successful interactions.

Question #3: How do teachers and children engage in turn taking activities?

Turn taking has several levels in communication and language development. In this study the researcher found two categories of turns: Social interactive turns and turns that involve content. Turn taking as a basic social interactive (Bruner, 1981) activity is defined, as stated previously in this study, as two people alternating turns with body movements, rhythm synchronicity, and shared empathy. Content turn taking, for the purpose of this study, reflects the ability of two people jointly attending to and interacting with objects. Content turn taking implies the ability to shift one's attention between objects and people interacting, which was defined as coordinated joint attention by Bakeman and Adamson (1984).

In Anna's case the few number of turn taking sessions observed were mostly social interactions and they were short sequences of mostly one to five turns based on movement and rhythm. Content turn taking also happened in one observed activity, although Anna was not as involved as in social interactive turn taking moments. In that case, the teacher induced Anna's turns by prompting her to perform part of the activity (prompting her to put glue on paper). A question remains about Anna's ability to involve herself in content turn taking without the teacher's support. Observation did not show examples of such situations.

Anna needs more opportunities for social turn taking. The teacher does not understand the importance of turn taking in her approach to Anna. Perhaps in Anna's case, and because she is still at a social level of interaction, social turn taking needs to be expanded while proving her opportunities for content turn taking. The objects that the

teacher and Anna use together were not meaningful and motivating. Objects/materials (e.g., paper, glue, foam) did not provide a shared topic of interest. Functional objects such as water and soap in hand washing motivated Anna. This functional activity might have allowed an opportunity for Anna and the teacher to wash their hands together and could have provided for a long chain of turns.

In Maria's case, turn-taking moments were also mostly by social interaction in the pre intervention sessions. The post intervention session showed Maria and the teacher engaged in content ruled turn taking. That is the foam container and the foam (objects) facilitated a sequence of turns. The foam and the foam container were a shared topic of interest. Their joint interest in the foam led to a long sequence of social interactive turn taking. It was obvious that both enjoyed the interaction. Mutual enjoyment of an activity or an object sustained turns.

Maria's teacher has a natural ability at social turn taking. This may be because she empathizes with Maria and tries to figure out what Maria enjoys. For example, Maria's response of smiling when the teacher tickled her arm in M11 (foam playing one on one activity) motivated her to do it again and naturally expanded the routine. Turn taking requires rhythm between two people. The teacher paused and waited for responses from Maria before she continued the routine. Her pacing was adjusted to Maria's responses naturally. This teacher's natural ability to take turns and pace to Maria's pre verbal communication provides a strong basis for further training in communication.

One point to consider in the analysis of turn taking is the level of interest in objects shown by both children. Anna does not show a particular interest in objects (nor in people for that matter), whereas Maria is very interested in people and reacts to objects when they are brought to her. It could be predicted, based on these data, that Maria's involvement in turn taking around an object might be higher than Anna's, which again indicates a higher

level of interactive development. Still, such an involvement requires information to be brought to her in forms that she can understand and access (e.g., objects combined with speech).

A question remains of how Maria can further develop joint attention skills/content turn taking in the absence of visual information. Although Bruner considers joint attention as an innate ability (Bruner, 1981), stimulation needs to be provided in order to support the development of such ability. Therefore it seems that Maria needs an abundance of information provided through touch along with the speech information that she now receives. As Vygotsky (1978) and Piaget (1926) state, there are clear relationships between cognition and communication. Maria needs to develop concepts and communication through content turn taking with real life objects.

Barber et al (1995) point out that there is not enough information to support the conclusion that children with multiple disabilities' ability to engage in social interaction activities determines further development into joint attention skills. Although children with multiple disabilities can easily get involved in social interaction without being taught so the same may not true for joint attention and content turn taking. Programming for children with multiple disabilities must therefore focus both on social and on content interactions if information is to be gathered that supports the assumption that they do or do not develop joint attention and coordinated attention skills. Children with multiple disabilities must be carefully and thoughtfully taught the things other children learn naturally. Observation has shown that turn taking that involves coordinated attention to people, objects or environments was usually not part of teacher/child interactions.

On the Likert-type scale there are four items related to turn taking that will be discussed here. They are item IAT (*the teacher incorporates turn taking into the activity)*, item CIC (*the child initiates communication)*, item RIC (*the teacher responds to child's*

initiations), and item ICC (*the teacher interprets child's behavior as communicative).* Results that will be discussed are only those that are statistically significant.

In Maria's case the raters somewhat agreed that the teacher incorporated turn taking in the post intervention session M11 (foam playing one on one activity). Raters agreed that the child initiates communication in session M7 (Snoozelan room). Raters disagreed that the teacher includes turn taking in sessions M6 (Snoozelan room) and M9 (foam playing group activity) Raters also disagree that the teacher interprets child's behaviors as communication in session M6 (Snoozelan room) and M11 (foam playing one on one activity).

In Anna's case raters disagree that the teacher included turn taking in sessions A4A (hand washing) and A6 (paper gluing). They strongly disagree that turn taking was developed in session A4 (foam playing). Raters disagreed that the teacher responds to the learner's communicative initiations in sessions A4 (foam playing), A6 (paper gluing) and A10 (music) and somewhat agreed that the teacher does so in session A4A (hand washing).

In what concerns the teachers interpreting the learner's behaviors as communicative, raters disagree in sessions A4 (foam playing) and A6 (paper gluing) and somewhat agree on session A10 (music).

There is no statistical significance for results related to Anna initiating communication. This is an interesting result that probably relates to Anna's passive behavior and lack of initiation noted during observations.

Summary of findings for question three (how do teachers and learners engage in turn taking activities): it is possible that the two observed cases are developmentally at different levels of ability to engage in turn taking. Anna mainly interacts at a social interactive level. Maria might engage in turn-taking involving joint attention as long as objects are brought to her. In Maria's case, and although Maria easily involves in interactions, the teacher often stops interaction after one turn.

Turn-taking moments observed during systematic observations were not valued by raters to be a relevant issue of interactions between teachers and children. Several reasons might support these opinions. Firstly, observed turn taking moments were often short and of little number, particularly in Anna's case therefore not creating an impact in the judges when it comes to making a general assumption on the subject. Also, the fact that judges might not have identified children's responses could have directed them into concluding that there were no turns when those turns involved subtle movements, such as in the case of Maria.

Both teachers engage in social interactive turn taking. A question remains about children's ability to involve in content turn taking in the absence of systematic training. Although Bruner (1981) states that both functions are innate, in the case of children with multiple disabilities social interaction seems to develop without children being taught, whereas the same does not happen for joint attention.

Apparently, content turn taking involving joint attention to objects is not as easily developed by teachers in both cases. Still, it should be noted that unless teachers and children involve themselves in turn taking that includes attention to objects there is little opportunity for learning in their interactions.

Question #4: What communication behaviors do teachers respond to?

In Anna's case, the teacher responds to Anna's inappropriate actions such as putting foam in her mouth, by telling her to stop. Responses are verbal comments or directions. She responds to Anna's appropriate use of materials by verbal praise. The post intervention session, however, showed the teacher imitating Anna's rhythmical movements (tapping on the table). This could be caused by either Anna's greater involvement in the activity (music) or the teacher's increased awareness of imitation after intervention since imitation, as a communication strategy, was included in the intervention plan.

Anna is passive and when she does nothing she is left alone rather than being encouraged to do activities or to interact with people. As stated with the previous question related to forms Anna does have a range of pre-linguistic forms of communication that are not acknowledged or responded to. Perhaps lack of responses by the teacher contributes to Anna's passivity.

Maria's teacher usually responds to behaviors that she considers communicative. Maria shows positive social responses to people which, in turn, encourage people to respond to her. The teacher responds to cries, vocalizations and to movements of her entire body. More subtle and isolated movements such as voluntary arm or hand movements are not noticed and therefore not responded to. The teacher also interprets Maria's behavior by playing double part (or"giving voice") to her non-verbal behaviors, speaking what she thinks Maria wants to say. This strategy may have a positive influence in Maria's understanding of what communication is about.

Summary of findings for question four (what communication behaviors do teachers respond to): Teachers respond to children's behaviors whenever they imply intentionality into behaviors. Nonintentional behaviors are often not identified by either of the teachers as ways to engage in interaction. Recognizing non-intentional behaviors as communicative and selecting behaviors that provide for more opportunities to engage in interactions with children with multiple disabilities probably requires specific training in preverbal communication that none of the teachers have.

Research is needed in the effects of the "giving voice" strategy. Apparently this strategy influences positively teacher/child interaction.

Question #5: Why do teachers miss opportunities for communication?

Systematic observation showed that teachers miss opportunities for communication. Results of the Likert-type scale confirmed that teachers often miss opportunities for

communication. Although non-responded behaviors are an important indicator for success in communication, other issues were brought to attention that need to be considered in the analysis of missed opportunities.

A first issue relates to choosing behaviors to respond to. Not all behaviors are to be responded to, and there are no rules that define which behaviors should be responded to. As Sigafoos et al (2000) suggest teachers should define potentially communicative acts in order to determine which behaviors are more subject to response.

How do teachers decide on the behaviors that should be responded to? In Anna's case, the teacher is mostly looking for responses. She does not look for behaviors to respond to, she mostly complains about Anna not responding. The teacher is not aware of the fact that her contribution is essential for communication with Anna. The fact that Anna has a low activity level with no identified intentional behaviors and that there are more children in class, might account for the teacher being less attentive to communication opportunities. Identifying potentially communicative acts is probably more difficult when the teacher does not have knowledge and practice in seizing potentially communicative acts and when the empathy developed is not high. It is also probably more difficult when the learner does not show communicative intent. Finally, Anna does not show interest in communication, which may decrease teacher 's expectations about communication.

In Maria's case the teacher keeps a social interaction that conveys emotion. Her caring for Maria might help the teacher identify and respond to communication opportunities. She likes being with Maria, enjoys interaction with her and is attentive to Maria's behaviors. Still, interactions do not include opportunities for communication development. Content is rarely included in interactions, no new information is transmitted, which leads to communication interactions that do not expand. Failing to include new

information and not attempting to develop content of interactions are also, in some way, missed opportunities for communication.

A last comment on missed opportunities relates to the small number of ways to express themselves that both children have. Children's use of few expressive forms leads inevitably to less communication opportunities. It requires specific training to be able to move from communicating spontaneously using personal skills, to being able to reflect and search for opportunities for communication specifically related to needs of the population of pre-linguistic multiply disabled children. Again, it should be stressed that the lack of communication severely interferes with the development of learning opportunities, therefore leaving children with no chances to learn.

Summary of findings for question five (why do teachers miss opportunities for communication): Teachers miss opportunities for communication because they do not identify potentially communicative acts, because they do not include new information in their interactions and because they do not provide occasions for communication and diversified experiences that could compensate for children's limited expressions and limited experience. Teachers also miss opportunities because they do not know how to identify unconventional and prelinguistic communication behaviors used by children with multiple disabilities who do not speak. Therefore, training is needed so that teachers learn to identify those behaviors on a consistent basis and provide responses that support communication development.

Question # 6: What are teacher's expectations about communication with these children?

Based on initial data collected about teachers and on interviews, the two teachers have different views about communication. Anna's teacher does not provide coincident responses to questions related to Anna's communication abilities. She refers to communication as the prime area to be developed in Anna's program, but she shows no

expectations about Anna's ability to communicate in the absence of speech. Teacher's expectations at the end of the research process were the same as in the beginning.

Anna's teacher locates the cause of communication problems in the child. She thinks Anna does not do enough in communication, she thinks the child refuses to communicate. The teacher thinks that Anna does not respond to speech because she does not want to. Still the teacher also says that Anna shows no signs of understanding people talking to her and that she does not communicate. This reflects poor understanding on the teacher's part of Anna and of communication in general. Again this points to a need for teachers serving with multiple disabilities to have training that helps them understand the importance of their role in addressing the unique communicative needs of children with multiple disabilities.

Nevertheless, the teacher's attitude towards Anna changed throughout the year. In the last observation the teacher imitated Anna and kept interactions going for some time. This could be either related to the activity or it could mean that the teacher has raised her expectations about Anna's communicative abilities. In any case, the teacher acts differently although she is not aware of the change. This may point to the need for intervention including reflection on practice as an important part of the intervention process.

Maria's teacher on the other hand considers communication difficulties her problem and not the child's. She thinks that learning to communicate with Maria is important for communication to be improved.

Maria's teacher responds to Maria's behaviors as communicative. She thinks it is important to identify nonverbal behaviors and interprets behaviors it in order to communicate with Maria. She considers communication as a priority area to be developed in Maria's program.

At the end of the research process the teacher had increased her expectations about communication. She points out the need to learn more about communication with children

who are at a pre-linguistic level and she has expectations about future intervention with Maria. She thinks that, with more learning on her part, communication can be improved and Maria can be asked to participate more actively in activities.

It should be noted that children's characteristics might account for the differences in teacher's attitude towards communication. Anna is not as socially communicative as Maria and her behavior does not attract as much attention as Maria's. More specifically Anna does smile and laugh a lot. Smiling and laughing are two pre-linguistic forms of communication that in all people are clear social forms and invite other people to respond. This might explain to some extent differences in teacher's expectations. Also, it is interesting to note that expectations are higher for Maria's teacher who thinks difficulties are her responsibility.

Summary of findings for question six (what are teacher's expectations about communication with these children): teachers view communication differently in each case. Anna's teacher thinks that Anna has communication problems that reduce opportunities for interaction. Maria's teacher recognizes that communication with Maria depends on her own ability to learn more about communication and therefore provide Maria with the means that help develop interaction.

Anna's teacher does not identify changes in the communication process, particularly in what concerns her own ability to interact with Anna. Maria's teacher recognizes that the intervention process was important and provided her with practical suggestions to increase her communication with Maria.

Question #7: Do teachers miss fewer opportunities for communication after an intervention procedure?

Intervention results take into account data from systematic observations and the results of the Likert-type scale. Results from systematic observations demonstrate that in both Anna and Maria's case, there is a decrease in the amount of non-responded behaviors in

the post intervention session. These findings are not corroborated by results of the Likert-type scale.

Item RIC of the Likert-type scale (*the teacher responds to child's initiations*) shows that raters agreed that teachers do not respond to children's initiations. Their agreement was significant for all sessions in Anna's case. It is interesting to note that although judges did not significantly agree that Anna initiated communication they agreed that teachers do not respond to initiations. A question remains of weather judges think there is no initiation and consequently rate that there is no response to initiation, or they think that there is initiation and still the teacher does not respond. In Maria's case, raters' agreement was only significant for sessions M11 (foam playing one on one activity) and M9 (foam playing group activity).

Item POI (*the teacher misses opportunities for communication*) on the Likert-type scale also showed that raters agreed that the teachers still miss opportunities for communication in the post intervention sessions. Raters' agreement is highly significant (.01) in both cases.

Questions arise as to why there is a discrepancy between the researcher's systematic observations of non-responded behaviors, which shows that there was a decrease in non-responded behaviors, and raters' agreement that teachers miss opportunities and do not respond to the learner's initiations.

First, perhaps the observers seeing video sessions one time did not allow for detailed observations that were permitted by systematic observation. Systematic observations counted the behaviors that were not responded to by the teachers. In the Likert-type scale's responses, raters were asked to give opinions about whole sessions. Raters may have overlooked teachers' non-linguistic responses such as touching the child as effective responses. Raters might also not have identified all behaviors as potential communication. During intervention for both Anna and Maria the need for responding to all behaviors was addressed and

explained to the teachers. In essence initiations (opportunities) and responses to behaviors may have been too subtle for the raters to observe. The researcher did not explain what is meant by missed opportunities because it was not brought up as an issue during the piloting, which might have been in fact, necessary. It might be the case that judges consider as missed opportunities for communication other issues apart from behaviors that were not responded to by the teacher.

Second, and particularly in the case of the missing of opportunities, it is possible that missed opportunities for communication include, in judges' appreciation, other issues apart from non responded behaviors. In fact, other statements included in the scale could also be central to the missing of opportunities, such as the nature of the activities (item FDI), which might or might not provide for communication opportunities, the pacing of interactions (item RRC) that encourages or discourages the child to communicate, or the including of learning opportunities in the interaction (item IPA) that may provide for new contents to be developed.

Summary of findings for question seven (do teachers miss fewer opportunities for communication after an intervention procedure): according to analysis of systematic observations the number of non-responded behaviors decreased after intervention in both cases. Raters' analyses of post intervention sessions still do not show a decrease of missed opportunities for communication. It is possible that other items apart from non-responded behaviors were taken into consideration by raters when assessing missed opportunities for communication. It is also possible that raters did not detect some of the initiations and consequent responses. An important point to consider is, nevertheless, that raters' opinion is that there is no increase of communication opportunities.

Question # 8: Does intervention improve teacher's interactions with children with multiple disabilities?

The analysis of missed opportunities for communication during systematic observations, which took into consideration children's behaviors that teachers did not respond to, showed that teachers do leave many children's behaviors un-responded to, but also that this number can be decreased through intervention.

An analysis of responses on the Likert-type scale pertaining to the post intervention session does not indicate that there are significant differences in teacher child interactions. Items that more closely relate to interaction, which are RIC *(the teacher responds to child's initiations*), RRF (*the teacher paces interaction according to child's needs*), POI (*the teacher misses opportunities for communication*) and IPA *(interactions provide an opportunity for learning*) are rated low and do not indicate difference from the pre intervention session.

In both cases teachers mentioned the need to increase interactions as an important concern for them. The programs designed both included strategies for increasing interaction through reducing the number of non-responded behaviors, as well as alternative modes of communication (such as tactile cues in Maria's case) or strategies to increase child's initiation (such as increasing participation in setting up activities in Anna's case).

A major question remains that relates to the time teachers had available to experiment the program (one month), which seems to be too short a period of time to produce effects in teacher/child interactions. It was only the fact that the school year was about to finish and both teachers were moving out of school that dictated the time of implementation. A second question relates to the absence of support from the researcher during the implementation period, which might have helped teachers to become more comfortable with using the program. Recent research on teacher preparation (Janssen, 2001)

related to communication with deafblind children in fact points out to the need of ongoing support in order for teachers to be able to improve their communicative interactions.

Summary of findings for question eight (does intervention improve teacher's interactions with children with multiple disabilities): An intervention procedure focusing on the decrease of the number of non-responded behaviors, and on provision of strategies that respond to teachers expressed communicative needs does not in itself improve teacher's interactions with children with multiple disabilities. More research needs to be done that deals with longer periods of program implementation and ongoing support along the implementation.

Findings related to the eight research questions will be considered in the next session as a basis for defining the implications for practice resulting from this study.

IMPLICATIONS FOR PRACTICE

Results from observations of the two studied cases reflect frequent needs of learners with multiple disabilities i.e., the need for meaningful experiences that include normal life activities, and the need for communication opportunities embedded in the activities.

Despite research in prelinguistic behavior teachers still do not view communication as a priority in programs for learners with multiple disabilities. They do not interpret pre linguistic forms of communication and they do not imply intentionality to learners' behaviors. Observed activities did not promote communication or concept development. Still, in both cases teachers mentioned that communication was a priority for their practice.

Assuming that learners with multiple disabilities have to be taught everything, from basic to abstract concepts, one cannot help but wonder how do activities such as gluing paper or playing with foam help a ten year old learner develop communication and teach such learners how to better cope with the future. In the absence of adequate training that supports decision-making, teachers in this study referred to their knowledge as preschool teachers and applied developmentally based models of intervention, leaving out essential information such as learners' age and its consequent needs.

Literature review stated that communication skills develop within the context of social and emotional relationships with others (Wetherby, Alexander and Prizant, 1998) particularly through early interactions between children and their primary caregivers (Dore, 1985). The studied teachers did not view learners as communicative partners. Interactions with more than one turn were seldomly noticed. Playing double part, like Maria's teacher did is a good starting point, as it develops caring and empathy, but it is the teachers' responsibility to take these interactions to the next level by incorporating content and learning opportunities in the interactions.

Multiple disabled learners have complex communication needs, and communication affects all aspects of development. Why is it that these learners have teachers with no training who both felt they needed more support that they got?

As a result of this study, two implications for practice emerge: a first one deals the need to develop communication centered programs that prepare teachers to work with learners with multiple disabilities; the second one relates to the need to set up intervention guidelines for communication intervention with learners with multiple disabilities who do not speak.

Teacher Preparation

Schools' needs

In the absence of policies ensuring that learners with multiple disabilities will be taught by teachers with specific training in the area, such learners are often left in the hands of less trained professionals who have no knowledge of what to do as teachers of such learners and therefore waste time with activities that do not provide for learning and do not prepare learners for the future. In such cases, any paraprofessional with good caring qualities would most certainly carry out the same role with a significant reduction in wage costs.

In Portugal, learners with multiple disabilities are often taught by unqualified teachers who cannot meet learners' communication and learning needs. Good practice in the area of teaching learners with multiple disabilities should include teachers with specialized training whenever possible. In-service training that addresses specific learning needs of this population should be available for teachers with no specialization who work with learners with multiple disabilities.

Meaningful communication that relates to normal life activities should be held central in any program designed for learners with multiple disabilities. An activity that is not valid in communication is not a valid activity with these learners. Teacher training programs,

therefore, need to include opportunities for teachers to question their practice and to problem solve in ways to incorporate communication into all aspects of the curriculum.

It would be unrealistic to separate educational needs of learners with multiple disabilities from special education needs in general and from the national policy in special education. The inclusion model that is being used in the country, although presenting potential for educating learners with multiple disabilities particularly in what concerns access to normal life opportunities, still needs to be adapted to the needs of such a population. More than adapting the population to the model, there is a need to adapt the model to the needs of the population. Placing a child with multiple disabilities in a regular school without providing for his/ her individual educational needs is a means of exclusion. Such educational needs include the need for trained teachers that know how to develop programs for these learners and how to incorporate communication in all areas of the program. Information about learners with multiple disabilities and their communication needs should therefore be included in existing programs of regular education teacher's preparation if inclusion is to be considered a valid approach to the education of learners with multiple disabilities. Moreover, in-service training with an emphasis in multiple disabilities and communication needs should be compulsory for special education teachers working with such learners.

Best practices

Training in the area of communication with learners with multiple disabilities should prepare teachers to assess learners' communication needs and to design intervention plans that meet those needs. Best practices in teacher training should therefore include opportunities for teachers to develop: a) positive expectations, b) theoretical knowledge and, c) practical skills about prelinguistic communication and about the way communication should be used to support teaching and learning.

Positive expectations should be central in teacher's beliefs about their work. In our study, and particularly in the case of Anna's teacher the teacher did not view Anna as a potential partner and did not have positive expectations about her participating in communicative interactions. Teacher training programs must provide opportunities for the development of teacher's awareness of learners as communicative partners and of positive attitudes about learners' ability to participate in the learning process as long as adequate means for communication are provided. Beliefs about what learners can do in future life, as long as their learning needs are provided for, should support positive expectations that help set up a positive intervention. Such expectations should also include an awareness of the possible roles of the family and the community as providers for meaningful environments and communicative opportunities as well as partners in decision-making concerning educational goals. By acknowledging these roles teachers become involved in a collaborative process that enlarges expectations, provides for ongoing support and eventually reduces stress and negative feelings about the process.

Finally teacher preparation programs need to understand the importance of teacher's positive perceptions of their own skills and responsibilities, as a basis for successful intervention as teachers of learners with multiple disabilities (Soto and Goetz, 1998). As stated by Raudenbush, Rowan and Cheong, (1992) teachers who believe they can teach well are more likely to believe that learners can learn well.

Theoretical knowledge refers to providing teachers with in-depth information related to communication in general, to communication development with an emphasis in prelinguistic communication, to communication characteristics of interactions with learners with multiple disabilities and to the need for communication intervention to be based in meaningful contexts that set the basis for access and development of contents. Theoretical knowledge must also include information that enables teachers to understand the importance

of real life experiences as central in the education of these learners. . None of the teachers in this study had knowledge on issues related to the communication challenges of the pupils with whom they work.

Important as it may be for the success of teachers' intervention, theoretical knowledge in itself hardly prepares teachers to become efficient in their role of teachers of learners with multiple disabilities in the absence of strategies that help them understand how they can best implement theoretical knowledge into their practice. Therefore, programs must include ways to help teachers integrate theory and practice in their intervention.

Practical skills must also be part of teacher training. Teacher's practice should reflect and be based in theoretical knowledge related to the specific needs of the population they work with. Training programs need to include strategies such as supervision of practice that helps teachers reflect and discuss results of their work. Reflections over practical experiences that integrate discussion of theoretical implications of the communication options used in such experiences are a good strategy for integration of theory and practice.

Both teachers in this study used mainly speech to communicate with their pupils. Changing communication behaviors is not always easy for teachers who are used to speech as the main form of communication. Training and experience may be needed for an adult to become fluent in the use of less used communication modes such as signs, or objects (Kaizer and Goetz, 1993). It requires time and supervision to learn to respond to the communicative needs of the learner (Janssen, 2001). Teachers should leave preparation programs with skills both in the use of techniques to apply, including the ability to use alternative means of communication and in reflective habits that lead them into questioning their practice as a basis for assessment and intervention change whenever necessary.

These questioning habits should include the ability to assess their communication efforts when confronted with learners who do not use speech to communicate. Observation

of teachers' own acting as partners in communication through the use of videotapes should provide a solid basis for discussion. Such strategy follows orientations that stress the need for reflections to be based in direct observation of teachers' practice (Schön, 1992).

Communication Intervention

Analysis of the results of this study points out to three main issues related to teachers' intervention. First, teachers do not engage in turn-taking interactions and do not develop conversations with learners with multiple disabilities. Second, teachers do not base their interventions in real life experiences that provide for learning contents and support the development of communication. Finally, teachers do not show knowledge of strategies to increase communication and learning opportunities within turn taking interactions.

Any educational model to be used in the education of learners with multiple disabilities must take into consideration these issues. Learners with multiple disabilities often do not have incidental access to the world around them, they do not experience the world like other children do, and therefore need to be taught to interact with diverse environments and people. Meaningful interactions embedded in real life activities are essential for learning and communication development. (McLetchie and Riggio, 2002, Downing, 1999, Siegel Causey and Downing, 1987).

Normal children are exposed to information and interactions at all times, which creates redundant experiencing opportunities that ensure learning. Learners with multiple disabilities do not have access to incidental learning and therefore need programs that provide "over emphasizing, over meaning and over repetition" (Bairrão, 2001). Providing learners with diverse communication experiences embedded in real life experiences are valuable ways to guarantee that such concepts are met. Real life teaching guarantees that emphasis is put in meaningful experiences that provide a solid basis for communication and

learning. Also, real life experiences have a natural potential for meaningful repetition thus providing for natural opportunities for generalization.

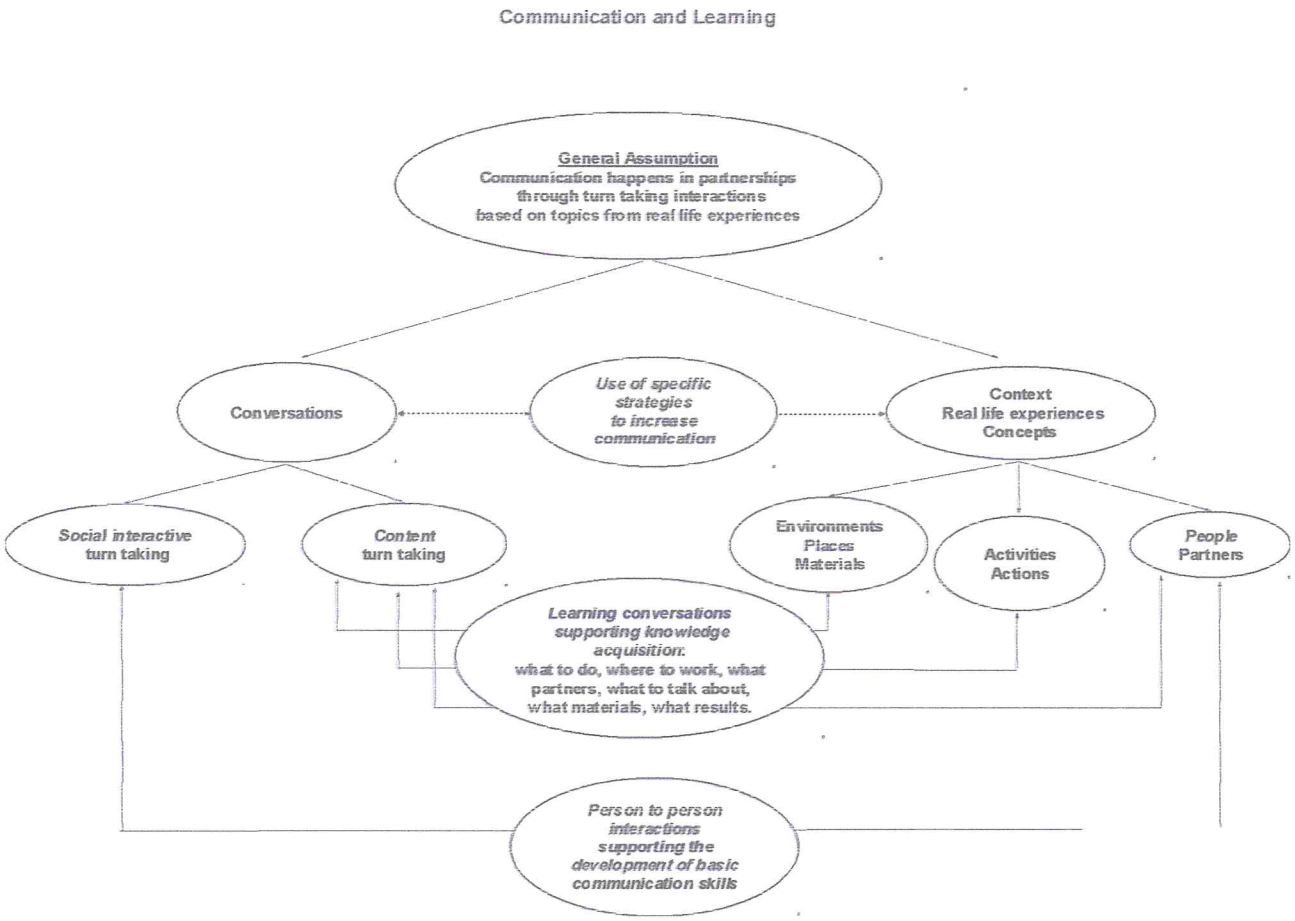
Communication and learning: a graphic model

A graphic model was developed that describes the way communication and learning interact and how concepts such as turn taking and real life experiences should be put together in the development of communication plans for learners with multiple disabilities.

Graphic models are useful tools to support organization of knowledge and help provide insight into relationships among various concepts. Such models can be used to represent and organize information about a formal domain of knowledge or they can be used to communicate an individual's knowledge about a topic (Novak and Gowin, 1984). The design of the graphic model used concept-mapping techniques, which proved to be useful to support the development of metacognitive processes in learning. (ibid). Drawing of the model was supported by the use of *INSPIRATION*, a specific software for concept mapping drawing. Figure 3 displays the graphic model.

This model intends to provide a visual support for decisions to be made when programming for communication intervention with learners with multiple disabilities in school settings, and assumes that development and learning happen through the development of interactions in real life activities. It is consistent with Vygotsky's assumptions (Vygotsky, 1993) that disabilities in itself are not the main problem of a child with special needs. It is mostly the impact of the disability in children's participation in activities that limitates development.

Figure 3 - Communication and Learning



Learners' interactions with real life experiences should therefore be increased through conversations between learners and their communicative partners. Such conversations create opportunities for learning about environments and also for learning about what to ask, what to request, what to question or what to refuse in the same environments.

Development of turn taking interactions

Social interaction

Observations in this study showed that teachers develop basic social interactive turn taking with learners but they do not work on interactions in order to increase number of turns and therefore support the development of conversation abilities. Maria's teacher in

particular, often involved herself and Maria in turn taking interactions based on movement and rhythm; still, she did not show the use of strategies to increase the number of turns and to create longer conversations.

Turn taking is the basis for conversation. Teachers need to read and respond to children's signs encouraging the development of more and longer turns in conversation.

Development of social interactions that are synchronic and time ruled is an important basis for the development of basic communication skills that enable teachers and children to trust and enjoy each other. Such interactions are usually based in movement, rhythm and repetition, and reflect the way interactions happen in early turn taking between mothers and infants (Trevarthen, 1977). In social interactions, children and teachers mostly attend to the other person as a partner in interaction. The teacher takes a child's movement, repeats it and waits for the child to give notice that he/ she wants the movement to continue. By doing so the teacher engages in interaction with the child. The teacher can also initiate a movement the child likes, wait for the child to give a sign and then produce the movement again. Van Dijk (1986) refers to these interactions as *resonance*, meaning that the teacher mostly provides resonance for children's behaviors. Social interactive turn taking, as shown in the model presented in Figure 3 supports the development of person-to-person interactions that set the basis for topic ruled interactions.

Content turn-taking

In this study, teachers did not engage in content turn taking interactions. In both cases, interactions between teachers and learners were noticed only at a social interactive level, with the exception of A6 (paper gluing) during which the teacher asked Anna to act on objects. Still, the teacher did not take this as an opportunity to work with Anna in terms of conversation, and interactions were reduced to one turn in most cases

The teacher's ability to take social interactive turn-taking into more developed conversations around topics, is essential for learning. In content turn-taking conversations must be centered around an object, a person or an event. It requires that teacher and child have coordinate attention skills that enable them to jointly attend to objects and to shift attention between information provided by objects and information provided by partners in conversation (Mundy and Willoughby, 1998). It is the teacher's role to seize what objects, persons or events most interest the child and use it as topics for conversations. Through conversation more topics can be introduced and longer turns can be encouraged.

Development of real life experiences

Intervention centered in real life experiences has been reported in the literature as a basis for communication development and learning (Cripe and Venn, 1977, Miles and Riggio, 1999, Downing, 1999). Activities observed in this study, with the exception of A4A (hand washing) were not real life experiences and therefore did not provide for opportunities to increase learning about environments, about activities that are performed in those environments and about people acting in such environments.

The use of real life experiences in educational intervention with learners with multiple disabilities is based in several assumptions:

- Real life experiences are experiences that are meaningful to the individual child in the context of his/her life, family and community and therefore provide context of interactions.

- Real life experiences provide for meaning that is easily grasped by children as it relates to their own needs.

- Real life experiences, because they are part of the learner's normal life, have a potential for repetition that supports learning.

- Real life experiences have clear outcomes that support the learner's understanding of means-end processes.

Teachers using real life experiences should make sure that experiences happen in normal environments in order to provide for context and meaning. Normal environments are environments where the activity usually takes place.

Selection of the most significant activities in an environment, as well as the actions that learners will learn to perform in an activity, need to be carefully planned so that meaning is made clear in learners' minds at all times. Additionally, teachers must select and include new partners whenever possible. People who are part of an environment or activity should be asked to interact with learners so that the number of natural communication partners is enlarged and learners learn to communicate with as many different partners as possible.

An analysis of the model presented in Figure 3 helps understand the role that environments, activities and partners have as topic providers for learning conversations that are supported by real life experiences. Such conversations increase opportunities for learning about the world and about learners' participation in real life experiences.

Strategies to increase communication opportunities

Communication is both a means and an end in the learning process of a learner with multiple disabilities. Learners need to develop communication but also need to use communication in order to learn about new subjects.

Results of this study suggest a set of topics that should be considered in the development of communication opportunities for learners with multiple disabilities. These topics are: 1) identifying interpreting and responding to learners' behaviors, 2) encouraging initiation, 3) use of appropriate forms of communication, 4) support the development of communicative functions, 5) increase the number of turns in interactions, 6) pace interaction according to learners' needs, 7) select appropriate topics of conversation and, 8) use routines

for anticipation and repetition A discussion of each topics follows, together with examples of strategies to be used.

- *Identifying, interpreting and responding to learners' behaviors* - Learners with multiple disabilities often communicate through the use of non-conventional forms such as movements, eye gaze or objects. In the presented study, teachers often missed opportunities for communication because they failed to identify and respond to learner's behaviors as communicative. For example, Anna's teacher did not pick up Anna's movements in session A4, when Anna was playing with foam, as a basis for the development of interaction. Teachers need to learn to identify behaviors as potential communicative acts (Sigafoos et all, 2000) and select the ones that better support the development of interactions.

Useful strategies concerning this issue include: 1) observing and attending to learners' behaviors, 2) imitation of learners' behaviors, 3) identification of behaviors that are more likely to be responded to according to the context and the activity, 3) responding to these behaviors using appropriate forms, and 4) making sure that the initiated conversation includes several turns.

- *Encourage initiation* - Learners with multiple disabilities need to be kept active in the communicative process. Teachers in this study showed more initiations than children, which reflects less attention being given to supporting and expanding of children's initiations. Encouraging initiation supports the development of choice making and prevents learned helplessness (Seligman, 1975) that is often a characteristic of learners with multiple disabilities. Both teachers in this study spoke to children leaving little space for children to initiate communication using appropriate forms In Anna's case, most of Anna's behaviors were left un-responded to, which does not encourage initiation.

Appropriate strategies to encourage initiation include: 1) waiting for learners to initiate a movement before starting a conversation 2) providing learners with alternatives

within an activity to encourage choices, 3) responding to learners' behaviors in meaningful ways so that learners feel that their initiations are useful and create a response in a partner.

- *Use appropriate forms of communication* - Communication should be supported by the use of forms that are part of learners' communicative repertoires. This study reports teachers to use speech as the main form of communication although there is no indication that learners understand speech alone. Teacher's speech should always be augmented with the communication forms that best suit learners' communication needs. Such forms are often at a prelinguistic level such as movement or objects.

Developing the use of appropriate communicative forms can be accomplished by: 1) carefully selecting which forms serve the individual learner, 2) introducing more than one form whenever possible to enlarge communicative opportunities (e.g., a child who can use pictures might also benefit from using objects or gestures), 3) using selected forms consistently when communicating with the learner, 4) providing for new communicative forms whenever learners show that they can be given more abstract levels of communication (e.g., if a child uses just objects to communicate, it is useful to assess his/ her abilities for using pictures or gestures. The decision should depend on the learner's abilities) and, 5) use speech always augmented with communicative forms selected for the individual learner.

- *Support the development of communication functions* - Particular emphasis should be given to requests, negations and calls for attention, which are basic functions related to early communication levels. Particularly in Anna's case, the teacher did not imply intentionality into Anna's behaviors, reducing Anna's awareness of the communicative potential of her behaviors. In Maria's case, although the teacher implied intentionality and therefore provided for different communicative functions, there was no strategy used that helped Maria in understanding which communicative forms could she use to express the communicative functions implied by the teacher.

Modeling of different functions in context, creating communicative opportunities for the use of different functions, and providing learners with appropriate communication forms to express communicative functions are effective ways to develop and diversify the use of communicative functions.

- *Increase the number of turns in interactions* - Interactions that rely on one turn are frequent in communication processes with learners with multiple disabilities who do not speak. This study found that longer turns in teacher child interactions were usually related to social interactions and did not support topic exploration. Communication between Anna's teacher and Anna was frequently made of an initiation on the teacher's side and a response. The teacher did not pick up on Anna's responses to encourage more turns.

Although social interaction is an important basis for the development of further interactive skills, content turn taking needs to be explored and extended in order to support introduction and exploration of meaningful topics from real life activities Teachers need to encourage interactions to grow longer by responding and expanding on learners' turns and by including in such interactions meaningful topics that provide content and support further learning.

A useful strategy to increase the number of turns is to always respond to learners' turns, therefore leaving to the learner the decision to end a conversation. Other strategies may include 1) starting by developing social interaction turn-taking that helps learners understand partners' role in conversations 2) introducing new topics in conversations, to keep learners interested and motivated to interact, 3) introducing more information concerning the same topic and 4) making sure learners understands that the teacher expects them to take their turn, which includes the teacher's ability to wait for responses.

- *Pace interactions according to learners' needs* - Learners with multiple disabilities often have information processing characteristics that require teachers to wait for answers

longer than what normal conversations would lead them to expect. The presented study indicates that teachers do not pace interaction according to learners' needs, therefore reducing opportunities for the learner to have his/her turn in a conversation. In A10, the music lesson, the teacher did not leave time enough for Anna to imitate gestures that went with the singing. Anna often started a movement when the teacher was already busy with a new movement.

Unless teachers learn to pace their turns with learners' turns, interactions will be non-synchronic, leading to frustration on the teacher's side and to withdraw on the learner's side. On the long term such asynchrony will result on a decrease of interest in interaction. Developing expectations about learners' ability to take turns in a conversation and providing time for the learner to respond are two basic issues that teachers need to incorporate into their practice as effective communicative partners. A useful strategy to pace interactions is to always believe that the learner will take his turn even if delayed, and to believe that the learner's turn is as much important, if not more important than the teacher's turn.

- *Select appropriate topics of conversation* - Teachers in our study did not incorporate topic ruled conversations in their practice. Observed interactions were basic person-to-person interactions. They did not introduce themes in conversations and did not explore potential topics introduced by children (e.g., in A4A, when Anna and the teachers were washing hands, Anna reached for water but the tap was closed. This could have been a topic for conversation).

Such limitation in teacher's intervention leaves learners with no opportunity to explore environments and therefore reduces learning opportunities. Again, the use of meaningful activities based on real life experiences is an important strategy to provide for conversation topics Within an activity teachers should: 1) select what topics to talk about, taking into consideration that it is not possible to talk about everything in the environment, 2)

make sure that the topics introduced contribute to the increase of learning according to each learner's individual needs, 3) introduce vocabulary in forms that the learner uses and 4) make sure that topics are motivating for the learner.

- *Use routines for anticipation and repetition* - Learning involves the ability to use whatever is learned in all appropriate contexts. The use of activity-based routines is an important basis for repetition and use of learned skills in context. (Cripe and Venn 1997).

Studied teachers did not value routine based activities as a means to increase child participation in the activities. Two exceptions should be pointed out, one in Maria's case session M11 (foam playing one on one activity), during which the teacher sets up a rhythmical routine for the interaction, and another one in Anna's case session A4A (washing hands) in which teacher and child perform a predictable routine. In Maria's case the interaction is a social interactive one and does not provide for topic exploration. In Anna's case the teacher did not use the contents of the routine based activity as a basis for topic exploration and learning.

Teachers should organize activities in sequentially predictable ways, to help learners understand how an activity is developed and what the learner is expected to do in an activity. The use of routines in real life activities also supports repetition as activities are often performed in learners' lives. This will ultimately encourage awareness of teacher's expectations, encourage initiation and support feelings of success.

As teachers participating in this study both left school at the end of the school year, definition and implementation of individual communication goals resulting from observation and intervention analysis was not possible. This is considered as a limitation of this study. Other limitations of the study, as well as suggestions for future research, will be presented in the next chapter.

SUMMARY, DISCUSSION AND CONCLUSION

This chapter includes an overview of the whole study. A *summary* details the fundamental topics addressed in the study, whereas the *discussion* highlights new questions raised in the process, limitations of the study and implications for future research. A final *conclusion* is also presented.

Summary

This study observed and described interactions between learners with multiple disabilities and their non-trained teachers and studied the impact of an intervention process in the interactions. A case study design involving two teacher/child dyads was used to support data generation. Methods of data generation included the use of participant observation, systematic observation, interviews and an opinion scale.

Results of the study indicate that studied teachers did not spontaneously develop communication skills that respond to learners' communicative needs. The use of appropriate forms and functions to communicate, the ability to develop turn taking interactions that convey information, the ability to detect opportunities for communication and to appropriately respond to learners' potentially communicative behaviors, and the ability to set up environments that provide for communication opportunities and learning were found to be areas in need that must be included in training programs for teachers working with this population.

The study also shows that intervention based on teachers' expressed communicative needs, although decreasing the amount of learners' behaviors that are not responded to by the teacher, does not substantially change interactions.

Implications for practice resulting from data analysis were defined and a model of decision making for the development of programs to be used with learners with multiple disabilities was designed. Based on that model suggestions of possible strategies were

pointed out that may help teachers define their intervention with learners who have multiple disabilities and do not speak.

Discussion

This study intended to describe and explain how teachers and learners with multiple disabilities interact when speech cannot be used as the main form of communication. The researcher expected to bring light to this question and, by doing so, to create ground for the development of better learning conditions for these learners. The decision to include an intervention process in the study was a way to go deeper into the exploration of good practices for developing communication and learning.

Answering the selected research questions carried along the raising of new questions that will be matter of discussion here. A first issue deals with the nature of this population. Although both were considered as multiply disabled, the two case studies in this research project had very different characteristics. Little is known about the learning abilities of learners with multiple disabilities. Attempts to use information resulting from research in the so-called normal population have provided little if no support at all to the understanding of such learning abilities. Variations in the combinations of disabilities as well as individual variations in the effects of each disability create unique situations that require long-term research processes if information is to be gathered about learning characteristics of this population. Taking this into consideration, the results of this study cannot provide more than a small increase in the understanding of the needs of these learners.

A second issue relates to educational settings for these learners. Results of this study indicate the need for teachers with high expectations, knowledge and skills. Such needs imply the need for organizations taking care of this population that have also expectations about learners' learning abilities and that view themselves as educational resources that encourage teachers to effectively teach learners with multiple disabilities. Teachers in this

study both felt that the support they needed was not provided to by the school. As a consequence, teachers in this study did not view themselves as educational partners that value communication as the basis for the increase of learning opportunities

Another issue that rises as a consequence of low expectations is the lack of good examples of educational programs for learners with multiple disabilities that include communication and learning as essential elements of teaching. Training teachers to work with learners with multiple disabilities would benefit from the use of good examples that helps raise teachers' expectations and that believe that such learners can be taught.

Communication with learners who do not speak and who function at a prelinguistic level of communication is another issue of reflection. Observation in this study indicated that turn taking at the level of social interaction could be developed between teachers and learners in the absence of teacher training. Although teachers do not know what to do to improve interactions, particularly in what concerns creating longer turn taking sequences, they spontaneously engage in occasional turn taking interactions based on empathy, rhythm and movement. The same does not happen for content turn taking. Although it can be said that learners do not engage in content turn taking because they did not have formal teaching, a question remains of why did teachers manage to develop social interaction and not content turn taking. Issues related to the ability of learners to use objects and to alternate attention between objects and partners require further research.

A final question deals with communication and learning, and the combination of such topics in the development of programs for learners with multiple handicaps Approaches in education of learners with multiple handicaps are not always coincident in the way they view communication and the way communication is embedded in educational plans Although both teachers valued communication as they ranked it to be important in learners'

programs, observation showed that they did not use appropriate means of communication to support learning.

Communication should not be viewed just as a means to exchange information concerning the development of other learning areas. Communication must be considered as a major curricular area in all programs with particular emphasis in the case of learners who do not use speech to communicate. Teachers should be able to devise creative strategies that both look at communication as a goal and that use communication as a means for the increase of learning opportunities.

Reflection over these topics drove the researcher into defining limitations of this study. These limitations will be discussed in the following section.

Limitations

The presented study intended to provide in-depth understanding of communicative interactions between non-trained teachers and learners with multiple disabilities in school contexts. Therefore information related to the communicative characteristics of studied children in contexts outside school was not collected, leading to a picture of each learner's communication abilities that is limited to their performance in school.

Development of communication intervention requires the teacher to assess communication in contexts that are part of learners' daily life. Although an assessment of communicative abilities of learners in this study was carried out, which included gathering information concerning communication in the family, such information was used as a basis for characterization of learners' communication and not as a basis for the development of communicative strategies in the intervention program.

Intervention used teachers' expressed communicative needs to develop a communicative plan. It did not include recommended guidelines for the use of real life experiences as a basis for communication development in learners with multiple disabilities

(Cripe and Venn, 1997, Miles and Riggio, 1999, McLetchie and Riggio, 2002). The researcher assumed that this would be too difficult a change to be made in teachers' ability to intervene with learners, which did not comply with the available time for this research. Therefore an option was made for an intervention based on activities that were part of the classroom schedule.

Intervention also did not include strategies to respond to the communicative needs that the researcher may have noticed. This decision most certainly had an impact on important aspects of communication, such as the use of the most appropriate forms and the development of content turn taking interactions.

Available time for data collection was also a limitation. As a consequence, results of observations were not systematically discussed with teachers before intervention. Such discussions could have brought light into what teachers intended to achieve when performing a particular activity or using a communicative strategy, and might help understand teachers' difficulties therefore providing for a stronger basis for intervention planning.

Researcher's use of videotapes may have influenced teacher/ child interaction. A video camera in a classroom is intimidating and increases teachers' awareness not just of being observed but also of observations being kept recorded. Although the researcher tried to minimize such effects, by using a fixed camera and by not using the viewer, the effect of this type of observation can have consequences in teachers' communicative behaviors that are difficult to assess.

Another limitation relates to the fact that both teachers knew that the last videotaped observation somehow aimed at assessing change in interactions. Emphasis was put on children's behaviors more than on teachers' behaviors throughout data collection. Still, teachers were obviously aware of the implications that their own behaviors had in children's behaviors, which might have somehow influenced their own performance during post

intervention sessions. Although aware of these issues, the researcher found no way to overcome such limitations and therefore opted for considering it a possible bias.

Finally the fact that a communication program specifically designed for the two studied cases was not implemented and assessed stands also as a limitation of this study. The researcher believes that the design of such a program should take into consideration not just the way communication happens between teacher and learner but also the results of an ecological assessment that informs on the learners' abilities to communicate in all contexts of their lives as well as the communicative needs in each context. Furthermore, any communication program should provide orientations for communication improvement in assessed contexts. The limited time available for research and the fact that both teachers left school at the end of the school year made it impossible to design such a program.

Time availability and the fact that both teachers school at the end of the year made it impossible to assess long-term effects of the intervention process. Such an assessment is vital to determine usefulness of the strategies used.

Indications for further research

This study raised questions on issues that may benefit from future research. A first area relates to what is meant by a model of communication for learners with multiple disabilities. Although research on forms and functions used with the population of multiple disabilities is available, (Siegel-Causey and Guess, 1989; Mirenda, Donnelan, Mesaros and Fassbender, 1984) there is a need for research pointing out to other areas of communication, and particularly to the way turn taking develops in such learners. In our study, learners with multiple disabilities showed spontaneous social interactive turn taking abilities and difficulties in engaging in content turn taking abilities. The study did not provide detailed assessment of learners' ability to engage in coordinated attention activities that lead to content turn taking. As pointed out by Barber and al. (1995), there is not enough knowledge

to conclude that learners with multiple handicaps that engage in social interactive turn-taking are able to reach content turn-taking abilities. Research on the ability to engage in content turn taking and on the effects of teaching in the development of content turn taking skills is, therefore, necessary. It is also important that more research informs on the abilities to develop coordinated attention and content turn taking in the case of learners with multiple disabilities who are visually impaired.

Communicative interactions with learners with multiple handicaps develop through turn-taking interactions much in the same way interactions develop with any other learner. Still, within such interactions there are issues that need to be explored in order to support better quality in communication. How to select behaviors that best benefit from being responded to, how to pace interactions to allow for an active participation of the learner, how to select, within a given context, contents to explore that provide for better learning opportunities are among the topics that require further research. Good practices in the area of communication with learners with multiple disabilities often show examples of teachers who know both how to develop communicative interactions with learners and how to use communication as the center of the learning intervention. Research must explore such practices and identify which characteristics generate good examples of teachers of learners with multiple disabilities who use communication as the center of their intervention and as a foundation for learning. As an example, strategies such as "giving voice" to children, such as Maria's teacher did, need to be explored in order to assess its effectiveness in the development of communication skills for children who do not have speech abilities.

A final issue that requires research deals with the characteristics of learners with multiple disabilities and expectations for learning. Little is known about the way such learners learn and how to best provide for their learning needs. Behaviorist models of teaching have already shown that this population learns based on cause and effect strategies.

Still, those models have not been able to teach students how to adapt learned behaviors to diversified people and environments or how to develop control over their own life.

What is also left to be known is the way learners with multiple disabilities process information when such information is fragmented, limited and difficult to contextualize due to difficulties in accessing environments. What and how can these learners learn given their unique characteristics is not clear to professionals. Until more is known about learning characteristics of this population, teaching will always lack the fundamental support that allows professionals to accurately define their intervention based on each individual's characteristics and learning styles.

Conclusion

This study begun with the researcher's interest in understanding how communication processes between learners with multiple disabilities and non-trained teachers take place. Observations and an intervention procedure provided extensive data that helped understand the way learners and teachers attempt to communicate. The results of this study show that such communication processes are fragmented and do not provide for learning opportunities.

Throughout the study, the researcher had frequent opportunities to discuss such issues with professionals involved in research and in the education of these learners. Such discussions represented crucial learning moments that supported further reflections and provided the researcher with a more comprehensive view of the themes of communication and learning in the case of learners with multiple disabilities. Moreover, the use of research methodologies required for data collection and data analyses helped improve an attitude towards research that should underlie any intervention, either in teacher training or in direct consultation with teachers in the field.

Communication is such a complex process. It requires two persons to want to be involved with each other and share meaningful messages. Studying communication involves

close observation of both partners and their roles in the process. Studying possible changes in communication between learners with multiple disabilities and their teachers must therefore focus on changes teachers can introduce in interactions, as they are the ones that possibly have more control over the process. Focus on changes in learners' behaviors has no effect if teachers do not change. Changing interactions means changing the way both partners interact.

Although this study clarified some aspects of the communication process between teachers and learners with multiple disabilities it also created the need to continuously explore the subject in order to provide for better educational services and support teacher preparation in this area.

Issues of multiple disabilities and learning deserve some specific comments. These comments refer to the concepts of *success*, *progress*, *ability to learn* and *teacher's expectations*. Unless these concepts are part of teachers' beliefs when working with learners with multiple disabilities, this population will be left with no opportunity to learn.

Unfortunately this is still often the case. It requires specially trained teachers to recognize and improve learning potential in learners who do not perform in the same way as the so-called normal population does. In the absence of well trained teachers with positive expectations, multiple disabled children are often left in the hands of less skilled, less trained or less committed teachers that consider this type of learner as someone who cannot learn, make progress or have success, simply because the approach they use to teaching does not match learners' individual learning needs.

Responding to individuals' communication needs is essential and has a strong impact in all areas of the curriculum. This should be considered as a first priority in the development of learner's programs. Teachers need to communicate effectively with learners in order to teach them properly.

Results of this study increased the belief that unless communication is considered the center of all programs for learners with multiple disabilities, such learners will be left unattended in their most basic needs, i.e., the need to have people communicating with them, the need to understand the world around and the need to inform people in their environment about their wishes, their refusals or their choices. As Vygotsky pointed out, it is not the disability in itself that produces limitations, it is the inability to interact and cooperate with the world around that limits children with disabilities in their development of higher mental functions (Vygotsky, 1993).

As mentioned in the introduction of this dissertation, we do not know enough about the way learners with multiple disabilities learn. But there is little question that unless children are able to interact with environments and communicate with people in those environments, their developmental process will be seriously affected and their access to school opportunities will be decreased.

A possible conclusion is that partners in general, and teachers in particular, should direct their attention to communication while working with learners with multiple disabilities, providing them with meaningful ways to interact with the world around so that learners can access and share information, make decisions, express preferences, and influence the world in a way that will ultimately increase their quality of life.

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Appendix A

Results of the Callier-Azusa Scale and the Communication Profile

Anna -Results of the Callier Azusa Scale

Anna Results of the Communication Profile

Communication	Goal	Behavior	Frequency
I. Communicative Functions			
A. Request	Object	Gets up and goes get what she wants	Frequently
	Food/drink	Gets a cup	Occasionally
	Start activity	Gets materials from the shelf	Occasionally
	Affection	Leans on people	Frequently
B. Negation	Protest	Threatens people with undesirable gestures	Occasionally
	Refusal	Does not initiate desired movement	Frequently
C. Declarations/ Comments	Greetings	Smiles when the teacher aide comes in	Rarely
	Affirmation	Directs hand to object shown by Speech Therapist	Occasionally
	Exclamations expressing emotional reactions	Smiles when tickled Dances and smiles when hearing music	Occasionally
II . Expression of Basic Needs	Hunger/ thirst	Gets a cup when thirsty	Occasionally
	Fatigue	Lies on the mat	Frequently
III . Expressions of Affect	Boredom	Turns head away from activity; starts repetitive movements	Frequently
	Expresses dislikes	Throws materials on the floor	Frequently
IV . Preferences	Objects	Gets play dough from the shelf (teacher's interpretation -no communicative intent)	
	Activities	Plays with water, with foam, with color painting (teacher's interpretation -no communicative intent)	

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Maria -Results of the Callier-Azusa Scale

Maria - Results of the Communication Profile -

Communication	Goal	Behavior	Frequency
I . Communicative Functions			
A. Request	Attention	Stops moaning when people talk to her	Frequently
	Significant Person	Stops crying when mother comes to her	Frequently
	Object	Stops crying when given a pacifier	Frequently
	Social Interaction	Starts vocalizing when environment is to quiet. Stops if talked to.	Frequently
	More	Asks for movement, crying if the car stops. Uses hand to hit a switch that starts music. Reaches for adults' hand to restart a tapping movement on her leg.	Frequently
	Affection	Stops crying when people talk and cuddle her	Frequently
B. Negation	Protest	When left alone vocalizes with specific intonation When she does not like food she spits When people stop pulling her wheelchair she vocalizes with specific intonation	Frequently
	Refusal	Spits food	Frequently
	Desires cessation/ change in activity	Stops crying when moved from the wheelchair onto the mat	Frequently
C. Declarations/Comments	Greetings	Smiles when she hears familiar voices	Frequently

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Communication	Goal	Behavior	Frequency
	About errors/ mistakes	Laughs when she hears the teacher reprimand someone	Frequently
	Acknowledges information presented	Smiles when told that she is going to eat	Frequently
	Exclamations expressing emotional reactions	Cries with a specific tone when she is bored or in pain	Frequently
II . Expression of Basic Needs	Fatigue	Moans when left on the wheelchair for too long	Frequently
	Sick/ Uncomfortable	Cries when she does not feel well	Occasionally
III . Expressions of Affect	Happy/ pleasure	Smiles and laughs when hears father or brother's voices	Frequently
	Sad	States crying when left alone or scolded	Frequently
	Angry	Cries loudly and moves arms and legs	Frequently
	Excitement	Moves, smiles, laughs	Frequently
	Interest	Stops movement when people talk to her or about her	Frequently
	Expresses dislikes	Spits food	Occasionally
IV . Preferences	Objects	Stops crying when hearing music. Switches on the tape recorder when given a head switch	Occasionally
	Food	Smiles when presented with preferred food	Frequently
	Activities	Smiles when taken on a car or on a stroll	Frequently
	People	Smiles and moves when she listens voice of a favorite person	Frequently

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APPENDIX B

Form and Questionnaire Used in Teacher Characterization

Dados do professor

1 - Idade

30/35	36/40	41/45	46/50	mais de 51

2 - Sexo.....F.....M

3 - Nº de anos a trabalhar com crianças multideficientes.....

4 - Formação em Educação Especial .....S.....N.

Em caso afirmativo por favor especifique o tipo de formação

_____

5 - Formação em Educação de Crianças Multideficientes.....S.....N

Em caso afirmativo por favor especifique o tipo de formação

_____

6 - Número de anos a trabalhar com esta criança.....

7 - Tempo diário de trabalho com a criança

1-2 horas	2-3 horas	3-4 horas	4-5 horas	mais de 5 horas

8 - Áreas relevantes na educação de crianças multideficientes

Segue-se um conjunto de áreas relacionadas com a educação de crianças com Multideficiência. Por favor ordene-as, atribuindo o número 1 à área que considera mais

relevante num currículo para este tipo de crianças, e o número 8 à que considera menos relevante.

Número atribuído	Área
	Autonomia nos cuidados básicos (comer, vestir-se, usar a casa de banho)
	Desenvolvimento motor
	Integração sensorio-motora
	Treino da visão
	Treino auditivo
	Desenvolvimento da comunicação
	Desenvolvimento cognitivo
	Desenvolvimento da Socialização

9 - Auto-avaliação da competência comunicativa

Considere a seguinte escala, para avaliar os seus conhecimentos relativamente à área da comunicação com crianças multideficientes. Coloque um círculo à volta do número que melhor corresponde à sua avaliação:

1	2	3	4	5	6
Totalmente insuficientes	Insuficientes	Suficientes	Razoavelmente bons	Bons	Muito bons

Perguntas utilizadas no questionário aos professores

1 - Qual é, na sua opinião, o papel da escola junto de crianças multideficientes?

2 - Que actividades costuma desenvolver com a(s) criança(s) multideficientes com quem trabalha?

3 - Quais são as suas maiores dificuldades no trabalho com essa(s) criança(s)?

4 - Que estratégias utiliza para ultrapassar essas dificuldades?

5 -Como é que os professores podem ser auxiliados no seu trabalho com crianças multideficientes?

5 - Algum outro aspecto que gostasse de acrescentar?

APPENDIX C

Sequence of Analytical Process of a Participant Observation

1 - Exemplo de notas analíticas A 1 (rasgar e colar papel)

Comportamentos	Notas analíticas
Est. ajuda Anna a rasgar o papel. Anna olha para o lado.	Pouco interesse na actividade. Percebe o que se espera dela?
Anna agarra o papel com ambas as mãos. Leva-o à boca.	Explora com a boca. Necessidade de explorar a este nível?
Est. ajuda mão sobre mão.	Apoio individual
Mantém o papel na mão. Baloiça-se um pouco. Bate na mesa ligeiramente.	Porque será que ela bate ritmicamente na mesa?
A. está sozinha, Est. saiu de ao pé dela por momentos.	Pouco trabalho 1/1 com as crianças
Bate com as mãos na mesa com mais força. Alterna as mãos ao bater	Procura de ritmo
- Est. volta e procura de novo que ela rasgue - [Conversa entre G. e L. As crianças estão paradas a observar] - Est. sai para o café. Anna fica sozinha.	Pouca consistência na intervenção. Pessoas entram e saem
Anna encosta a cabeça à mão. Vira a cabeça para o lado. Bate na mesa. Sorri. Não faz nada durante algum tempo.	Será que percebe o que esta a fazer?
Volta Est. Dirige-se a Anna. Brinca com ela apertando-lhe a bochecha. "Então o que está a fazer a minha menina?"Anna sorri	Responde a presença de uma pessoa
- Anna bate de novo na mesa.	Procura de ritmo

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Comportamentos	Notas analíticas
- Anna agarra de novo o papel. Bate na mesa.	
	Não sabe o que deve fazer?
Auxiliar saiu	Pessoas entram e saem A não sabe o que se passa
Aux.e Ed. falam do G. que fez uma birra de manhã. G. entra com T.O. Altera-se a disposição na sala porque a cadeira do G. está no local onde estava sentada a Est. Anna fica por momentos sozinha	Mais movimentações dos adultos
-G. arranha-lhe a mão. Anna não reage -G. grita e Anna não parece interessar-se.	
Anna deita a cabeça na mesa, mão na boca, baba-se muito. Est. está de volta ao pé dela. Endireita-a, dá-lhe papel para rasgar.	Ser que percebe a actividade?
Anna manipula por momentos. Parece olhar para o papel que tem na mão com ar interessado. Vira-o. Rasga um bocadinho. Volta a rasgar. Encosta-se à Est. com a mão na boca. Tem papel na outra mão.	Não percebe o que esta a fazer
Anna está sozinha	E deixada sozinha
Afasta a folha de papel branco para a frente. Agarra bocadinhos de papel rasgado e fá-lo deslizar para ao chão. Pega num bocadinho. Olha-o e deita-o fora. Pega noutro. Olha. deita para ao chão. Pára.	Porque será que deita coisas para o chão? Não quer? Não lhe interessam?
Anna continua a deitar papel para o chão. Afasta a folha branca para	Quando deita cosias para o chão ela encontra um estrutura/ continua ate

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Comportamentos	Notas analíticas
mais longe. Atira mais um bocadinho de papel para o chão. Já só tem a folha branca.	deitar tudo para o chão.
-Bate com as mãos na mesa, repetidas vezes. Fixa as duas mãos no rebordo da mesa e empurra, balançando-se. -Anna bate na mesa com um movimento alternado dos dedos e do punho	Procura ritmo ao bater na mesa
Est. dá-lhe um novo papel para rasgar. Anna agarra-o. Anna espera com o papel na mão. Volta ao movimento de bater com a mão na mesa, alternando dedos e punho	Ser que ela percebe o que deve fazer?
Est. Mão sobre mão ajuda a rasgar.	
Est. vai buscar uma escova para pentear Anna	Actividade mudou de repente, sem explicação. O que pensará Anna.?
-Est. penteia Anna Esta espera. Abana a mão Dt.. Vocaliza.A O que foi, Anna?" - Anna pára de vocalizar. faz um som gutural Aux.: "Anna isso não se faz."	Adultos respondem a um comportamento verbal
Anna faz ruídos, com os lábios. Continua a mexer a mão	Movimento rítmico. Procura estrutura?

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2 - Síntese de notas analíticas das actividades observadas: procura de temas

A1 Rasgar e colar papel	A2 Jogo de encaixe	A3 Terapêutica Ocupacional	A5 Terapia da Fala
Pouco interesse na actividade Percebe o que se espera dela?	Gosta de ter um bocadinho de plasticina na mão. O que será que a plasticina provoca? Integração sensorial?	Não responde a solicitação verbal	
Explora com a boca. Necessidade de explorar a este nível?	Será necessário tirar a plasticina da mão para ela funcionar? Ou o contrário?	Não gosta que lhe tirem a plasticina que tem normalmente na mão Será um apoio táctil de que necessita?	Leva coisas a boca
Porque será que ela bate ritmicamente na mesa?	Desinteressada. Percebera o que tem que fazer?	Resposta lenta. Precisara de mais tempo ara realizar actividades pedidas?	Que tipo de respostas da a nível sensorial?
Pouco trabalho 1/1 com as crianças	Adulto afasta-se dela. Há uma movimentação constante de adultos.	Porque será que bate na mesa?	Haverá alguma limitação provocada pelas alterações nas fendas palpebrais/
Pouca consistência na intervenção. Pessoas entram e saem	Terá noção de que deve fazer uma tarefa ate ao fim? Não teve qualquer indicação	Parece reagir melhor quando ha informação táctil	Não reage ao som .
Será que percebe o que esta a fazer?	Aux refere que ela gosta de materiais que tenha que manipular, como plasticina ou espuma	Não lhe dão tempo a responder Quando responde e ao fim de alguma tempo depois de lhe ter sido dada uma ordem com apoio de objecto	Reage ao som depois de ter visto o gravador!! Associa tacto, procurando sentir a vibração
Responde a presença de uma pessoa	Não realiza a actividade. Não sabe/ não quer?	Bate repetidamente. Necessidade de um ritmo?	Ser reacção ao som ou a vibração apenas?

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A1 Rasgar e colar papel	A2 Jogo de encaixe	A3 Terapêutica Ocupacional	A5 Terapia da Fala
Procura de ritmo	Porque será que ela atira as pecas para o chão	Necessita de movimentos rítmicos/	Parece reagir mais a estimulação táctil do que a qualquer outra
Não sabe o que deve fazer?	Atira para o chão por desinteresse?	Não responde a solicitações verbais	Não me fica claro se ela reage apenas ao som
Pessoas entram e saem A não sabe o que se passa	Atira para o chão porque encontra uma ritmo para a tarefa?	Realiza actividades que tenham objectos e que ela veja qual e o objectivo (enfiar botões)	Educadora referiu que um dia ela ouviu a musica e começou a dançar….
Mais movimentações dos adultos	Espera- se que ela saiba o que deve fazer sem uma intervenção detalhada do adulto	As solicitações do adulto são por vezes inconsistentes. Diz uma coisa e logo faz outra.	
Ser que percebe a actividade?	Embora atire as pecas para o chão, a sua atitude não e agressiva. Parece mais uma negação	Não reage a solicitações verbais	
Não percebe o que esta a fazer	Interessante esta actividade de deitar pecas for a. ela estrutura a actividade, garantindo que a leva ate a fim!	Não reage a solicitações verbais	
E deixada sozinha	Não ha modelação, não ha interacção, não ha qualquer tentativa de troca de turnos par incentivar a participação.	Informação inconsistente. TO diz uma coisa e logo outra diferente	
Porque será que deita coisas para o chão? Não quer? Não lhe interessam?	A parece desinteressada	Respondeu a uma solicitação verbal ao fim de algum tempo e quando a TO já estava a fazer outra coisa.???????	
Quando deita cosias para o chão ela encontra um estrutura/ continua ate deitar	Parece desinteressada	TO refere que ela parece necessitar de contacto físico	

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A1 Rasgar e colar papel	A2 Jogo de encaixe	A3 Terapêutica Ocupacional	A5 Terapia da Fala
tudo para o chão.			
Procura ritmo ao bater na mesa	Procura ritmos Dão muita informação verbal que ela não parece entender	Gosta de PT e movimento em geral	
Ser que ela percebe o que deve fazer?	Em interacção comigo: Deixo-lhe ficar a plasticina Dou-lhe as pecas uma a uma e ela encaixa Aceita auxilio mãos sobre mão	Percebe relações de causa e efeito no computador. Não utiliza para realizar jogos.	
Actividade mudou de repente, sem explicação. O que pensara A.?	Responde a gestos naturais	E interessante que ela não parece totalmente desinteressada. Mais parece que não e capaz de realizar a maioria das coisas e que já esta habituada a isso.	
Aux. responde a um comportamento verbal?????????	Responde quando a solicitam a nível táctil com cócegas Reage a cócegas e a sons vocálicos e mantém uma serie de turnos	Cognitivamente parece ter poucos skills, mas a falta de informação sensorial significativa parece também ser muito grande.	
Movimento rítmico. Procura estrutura?	Seria melhor uma interacção uma a um?		

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3 - Categorização de notas analíticas das várias sessões - Anna

Realização	Papel do adulto	Interesse por actividade rítmica	Lentidão de resposta	Resposta a solicitações	Exploração sensorial
Pouco interesse na actividade Percebe o que se espera dela?	Pouco trabalho 1/1 com as crianças	Porque será que ela bate ritmicamente na mesa?	Resposta lenta. Precisará de mais tempo ara realizar actividades pedidas?	Não responde a solicitações verbais	Explora com a boca. Necessidade de explorar a este nível?
Será que percebe o que esta a fazer?	Pouca consistência na intervenção. Pessoas entram e saem	Procura de ritmo	Não lhe dão tempo a responder Quando responde e ao fim de alguma tempo depois de lhe ter sido dada uma ordem com apoio de objecto	Não reage a solicitações verbais	Não gosta que lhe tirem a plasticina que tem normalmente na mão Será um apoio táctil de que necessita?
Não sabe o que deve fazer?	Pessoas entram e saem A não sabe o que se passa	Quando deita cosias para o chão ela encontra um estrutura/ continua ate deitar tudo para o chão.		Não reage a solicitações verbais	Parece reagir melhor quando ha informação táctil
Ser que percebe a actividade?	Mais movimentações dos adultos	Procura ritmo ao bater na mesa		Dão muita informação verbal que ela não parece entender	Gosta de ter um bocadinho de plasticina na mão. O que será que a plasticina provoca? Integração sensorial?
Não percebe o que esta a fazer	E deixada sozinha	Movimento rítmico. Procura estrutura?		Responde a gestos naturais	Será necessário tirar a plasticina da mão para ela funcionar? Ou o contrario?

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Realização	Papel do adulto	Interesse por actividade rítmica	Lentidão de resposta	Resposta a solicitações	Exploração sensorial
Ser que ela percebe o que deve fazer?	Actividade mudou de repente, sem explicação. O que pensara A.?	Porque serra que bate na mesa?		Responde quando a solicitam a nível táctil com cócegas	Aux refere que ela gosta de materiais que tenha que manipular, como plasticina ou espuma
Desinteressada. Percebera o que tem que fazer?	As solicitações do adulto são por vezes inconsistentes. Diz uma coisa e logo faz outra.	Gosta de PT e movimento em geral		Reage a cócegas e a sons vocálicos e mantêm uma serie de turnos	Educadora referiu que um dia ela ouviu a musica e começou a dançar….
Terá noção de que deve fazer uma tarefa ate ao fim? Não teve qualquer indicação	Informação inconsistente. TO diz uma coisa e logo outra diferente	Bate repetidamente. Necessidade de um ritmo?		Seria melhor uma interacção uma a um?	Leva coisas a boca
Não realiza a actividade. Não sabe/ não quer?	E interessante que ela não parece totalmente desinteressada. Mais parece que não e capaz de realizar a maioria das coisas e que já esta habituada a isso.	Necessita de movimentos rítmicos/		Respondeu a uma solicitação verbal com objecto ao fim de algum tempo e quando a TO já estava a fazer outra coisa.	Reage ao som depois de ter visto o gravador!! Associa tacto, procurando sentir a vibração
A parece desinteressada	Adulto afasta-se dela. Há uma movimentação constante de adultos.	Porque será que ela atira as pecas para o chão			Não reage ao som .

Realização	Papel do adulto	Interesse por actividade rítmica	Lentidão de resposta	Resposta a solicitações	Exploração sensorial
Parece desinteressada	Espera- se que ela saiba o que deve fazer sem uma intervenção detalhada do adulto	Atira para o chão por desinteresse?			Ser reacção ao som ou a vibração apenas?
	Não ha modelação, não ha interacção, não ha qualquer tentativa de troca de turnos par incentivar a participação.	Atira para o chão porque encontra uma ritmo para a tarefa?			Parece reagir mais a estimulação táctil do que a qualquer outra
		Embora atire as pecas para o chão, a sua atitude não e agressiva. Parece mais uma negação			Não me fica claro se ela reage apenas ao som
		Interessante esta actividade de deitar pecas for a. ela estrutura a actividade, garantindo que a leva ate a fim!			
Cognitivamente parece ter poucos skills, mas a falta de informação sensorial significativa parece também ser muito grande		Procura ritmos		Realiza actividades que tenham objectos e que ela veja qual e o objectivo (enfiar botões)	

Realização	Papel do adulto	Interesse por actividade rítmica	Lentidão de resposta	Resposta a solicitações	Exploração sensorial
Porque será que deita coisas para o chão? Não quer? Não lhe interessam?		Aux responde a um comportamento verbal?????????	Percebe relações de causa e efeito no computador. Não utiliza para realizar jogos.		
		Porque será que deita coisas para o chão? Não quer? Não lhe interessam?			
		Haverá alguma limitação provocada pelas alterações nas fendas palpebrais/			
		Em interacção comigo: Deixo-lhe ficar a plasticina Dou-lhe as pecas uma a uma e ela encaixa Aceita auxilio mão sobre mão			

APPENDIX D

Code list of Children's Behavior Forms

Anna

Categoria	Nome do código	Código	Descrição de comportamento	Exemplo
Acção	Acção sobre o próprio corpo	AcC	Movimentos que parecem demonstrar finalidade e relativos ao próprio corpo	Lavar a boca
	Acção sobre objectos	AcO	Movimentos que utilizam um objecto com alguma finalidade (Distinguem-se da manipulação de materiais no sentido em que são dirigidos, tem uma finalidade.	Por cola no papel
	Acção sobre pessoas	AcP	Movimentos que se dirigem intencionalmente a outra pessoa - adulto ou colega	Coloca a cabeça no braço da educadora
	Manipulação de materiais	MM	O aluno mexe em materiais sem objectivo definido	Amachuca um papel que tem na mão
Resposta a manipulação	Cessação de movimento	CM	O aluno demonstra querer interromper um movimento iniciado pelo educador	
	Aceitação de movimento	AM	O aluno mantém as mãos na posição em que foi colocado pelo professor, sem alterar em nada a posição	
Atenção	Atenção ao adulto	AtA	Orientação do olhar na direcção do adulto parecendo seguir o que este está a fazer	
	Atenção ao colega	AtC	O aluno dirige o olhar para um colega	
Expressão	Expressão corporal	EC	Movimento generalizado do corpo	Deita-se para trás quando está a brincar com a educadora
	Expressão facial	EF	Sorriso, caretas	
Movimentos	Gesto	G	Movimento das mãos com aparente significado	Mexe na orelha
	Mudança de posição	MP	Alterações no posicionamento não relacionadas com qualquer iniciativa	Levanta a cabeça
	Movimento rítmico	MR	Movimentos repetitivos, lentos, não relacionados com o contexto e que se evidenciam em actividades diferentes	Bate com as mãos na mesa, alternadamente com o punho e com a palma
	Movimento rítmico contextualizado	MRC	Movimentos rítmicos relacionados com a actividade	Bater palmas durante a música

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Maria

Categoria	Nome do código	Código	Descrição de comportamento	Exemplo
Expressão facial	Movimento dos olhos	EFMO	Qualquer movimento dos olhos	Pisca os olhos
	Sorriso	EFS		Sorri
	Riso	EFR		Ri
	Movimento da face	EFMF	Qualquer movimento da face que pareça relacionado com o contexto	
	Alteração de expressão	EFALT	Qualquer alteração de expressão verificada a nível da face	Estava a rir e fica seria
Movimento	Movimento da cabeça	MC	Qualquer movimento voluntário da cabeça	Roda da direita para a esquerda
	Movimento do braço	MB	Qualquer movimento voluntário do braço	Move o braço em direcção a alguma estimulo
	Afastamento	MAF	Qualquer movimento que represente afastamento relativamente a estimulo anterior	Afasta a cabeça da face da educadora
	Posição da cabeça	MPC	Qualquer alteração da posição da cabeça	Levanta a cabeça
	Paragem de movimento	PM	Qualquer interrupção de movimento	Esta a mexer-se e para em resposta a estimulação
Outros	Vocalização	VOC	Qualquer som vocálico	"Aaaaa"
	Vegetativo	V		Tosse, espirra

APPENDIX E

Interview Protocols

Initial Interview

Recolher dados sobre:	Questões
Percurso pedagógico do professor	- Há quanto tempo é professor/educador? - Tem trabalhado sempre com crianças com deficiência?
Opiniões do professor sobre o trabalho com crianças com MD	- Porque trabalha com estas crianças? - O que acha deste trabalho? - O que considera importante na programação para estas crianças?
Conhecimentos sobre MD	- Alguma vez teve alguma formação nesta área?
Conhecimento da criança em estudo	Fale-me da..... Que coisas é que ela gosta de fazer? Que capacidades encontra nela? Quais são as maiores dificuldades que ela tem?
Tipo de comunicação utilizada com a criança em questão	- Consegue comunicar com.....? - Como comunica com a ela(e)? - Como acha que ela(e) o/a entende? - Conte algum episódio que demonstre como comunica com ela(e).
Dificuldades a nível da comunicação	- Tem algumas dificuldades na comunicação com .....? - Que coisas é que ela(e) consegue comunicar-lhe? - Que coisas gostaria de poder comunicar-lhe e não consegue? - Como se sente quando tenta comunicar com.....? - Conte-me uma episódio que ilustre dificuldades que possa ter a nível da comunicação
Conhecimentos sobre comunicação	- Interessa-se por este tema? - Tem alguns conhecimentos sobre formas de comunicação com estas crianças?
Necessidades	- Sente alguma necessidade de aprofundar estes conhecimentos? Porquê? - O que acha que necessita de ser feito para melhorar a comunicação com estas crianças?
Formas de responder a necessidades	- Acha que há necessidade de formação a este nível? - Como acha que essa formação deveria fazer-se? - Estaria interessada em discutir algumas das observações feitas na sua sala?

Final interview

Recolher dados sobre:	***Questões***
O processo de intervenção	O que pensa da presença da investigadora O que achou do programa de intervenção
A evolução da criança	O que pensa da evolução da ....ao longo deste ano
A motivação para continuar o trabalho com estas crianças	O que faria se lhe fosse dada uma nova oportunidade de trabalhar com estas crianças
Actividades que pensa serem úteis para o trabalho a nível de comunicação com estas crianças	Como organizaria no futuro as actividades para proporcionar às crianças as melhores oportunidades de comunicação?
Mudanças que julga necessárias para o trabalho com estas crianças	Se tivesse hipóteses de organizar o trabalho a realizar com estas crianças, como o faria? Que aspectos acha mais importante considerar?

APPENDIX F

Intervention Programs

Anna

A Anna é uma criança independente, que procura com frequência resolver as suas necessidades sem recorrer ao adulto. Normalmente não mostra qualquer comportamento de iniciativa comunicativa.

Imita gestos e identifica objectos do dia a dia . Por vezes parece compreender alguma linguagem oral, quando ligada a situações reais e acompanhada de gestos ou objectos. Responde a solicitações do adulto, mas apenas em situação de relação um a um.

Por vezes interessa-se pelo colega do lado, mexendo-lhe.

Gosta de materiais que possa manipular, nomeadamente plasticina, tintas e espuma.

Reage sobretudo a estimulação táctil.

Em reunião com a educadora, na qual foram visionados segmentos de vídeos feitos a partir de actividades de sala de aula, foram discutidas algumas das necessidades comunicativas da Anna e identificadas três aspectos fundamentais a desenvolver:

- ter uma forma de pedir o que quer (em particular água, que ela necessita de beber com frequência)

- aumentar as interacções com o adulto

- aumentar o envolvimento nas tarefas

Sugestões de intervenção

Objectivo	Organização da actividade/ tarefa	Estratégias
Pedido de água	Ter um copo em local onde ela o possa encontrar com facilidade	1 - Regularmente, ir com ela junto do copo, mostrar-lho, fazer um gesto de beber e ir com ela buscar água. Deixá-la beber. Por de novo o copo no local. Fazer um gesto de acabou. 2 - Se ele procurar o copo espontaneamente, ir junto dela, fazer o gesto de beber, deixá-la agarrar o copo, apontar para o local onde vai buscar água. 3 - Esperar para ver se ela vai buscar água espontaneamente. Ir com ela caso o não faça. Fazer um gesto de acabou no final.
Aumentar as interacções com o adulto	Ter um adulto em interacção um a um com ela durante um determinado espaço de tempo em cada actividade	Observar os comportamentos de A. Responder sempre que A tenha alguma iniciativa, ainda que não seja claramente com intenção comunicativa
Aumentar a participação nas tarefas	Realizar tarefas em conjunto (pôr papel nos lugares, pôr as tintas, ir buscar plasticina etc.)	1 - Preparação de actividades - Mostrar-lhe os materiais - Iniciar a colocação dos materiais na mesa - dar-lhe um objecto para ela colocar na mesa - colocar um objecto - pedir-lhe de novo que coloque ela (ir alternando turnos de execução: eu faço, tu fazes, eu faço, tu fazes) 2 - Na execução de actividades (ex: espuma) - dar-lhe pistas para iniciar (ex: apontar para a espuma)

Objectivo	Organização da	Estratégias
		- quando ela iniciar esperar até que ela páre um movimento - fazer o movimento igual ao dela e depois parar - esperar que ela reinicie. Se o não fizer, apontar-lhe para as mãos, ou imitar o movimento no ar . - voltar a imitar quando ela parar. Repetir os turnos até que ela demonstre querer parar -, alterar a certa altura o movimento procurando que ela imite um novo movimento

Maria

A Maria é uma criança simpática e reactiva à estimulação do adulto. Gosta de ouvir música e acciona um interruptor quando quer ouvir mais. Reage positivamente à presença de adultos conhecidos e a actividades de manipulação de tintas ou espuma, sorrindo e mexendo-se. Gosta de trabalhar no Snoozelan, sendo muito activa na solicitação de movimentos.

Em reunião com a educadora, na qual foram visionados segmentos de vídeos feitos a partir de actividades de sala de aula, foram discutidas algumas das necessidades comunicativas da Maria e identificadas aspectos a desenvolver, tais como:

- ter uma forma de explicar à Maria o que se passa à roda dela
- aumento de oportunidades de interacção com o adulto

Sugestões:

Selecção de objectos

Os objectos servirão à Maria para relacionar a informação dada verbalmente com a experiência, na ausência de informação visual ou de movimento exploratório. Através do seu uso será possível aumentar a informação e proporcionar à Maria capacidade de antecipar acontecimentos.

- Seleccionar um conjunto de objectos que ela utilize normalmente em actividades.

Exemplos:

- Cassete para ouvir música
- colher ou babete para o almoço
- casaco, ou chapéu ou mochila para saídas
- fralda para ir à casa de banho
- frasco de tinta (com um material de textura rugosa colado, para identificação)
- embalagem de espuma (identificado com um material de textura diferente do da tinta).

Utilização dos objectos

Fazer a Maria sentir na mão o objecto que se relaciona com a actividade, antes da actividade acontecer. Acompanhar com informação verbal (agora vamos comer, vamos pintar, etc.)

No decorrer das actividades, proporcionar à Maria oportunidades de exploração táctil dos objectos todos que se relacionem com a situação (ex: tocar a mesa, tocar a bacia de plástico onde se põe a espuma, tocar o plano inclinado). Usar informação verbal ao mesmo tempo.

Pistas tácteis

As pistas tácteis são também um auxiliar na antecipação de actividades, nomeadamente actividades que se referem ao próprio corpo (tirá-la da cadeira, mudar-lhe a fralda, deitá-la, etc.) São toques que se fazem no corpo da criança e que indicam a parte do corpo que vai ser manipulada, (ex: tocar-lhe na mão antes de vestir o casaco) ou o movimento que se vai seguir (tocar-lhe nas costas antes de a deitar)

Sugestões de pistas :

- levantar-lhe ligeiramente os ombros antes de a tirar da cadeira ou de a levantar do puf.

- tocar-lhe no rabo antes de a sentar

- tocar-lhe na cara antes de a lavar

- tocar-lhe nos pés antes de calçar os sapatos

Acompanhar todas estas informações com linguagem oral

Desenvolver trocas comunicativas

Sugestões:

Escolher uma actividade de que ela goste (ex: Snoozelan)

- iniciar um movimento

- parar o movimento

- esperar que ela dê um sinal de recomeçar o movimento

- recomeçar o movimento logo a seguir

- se ela fizer alguma tentativa de movimento diferente, imitar o movimento que ela fez.

- continuar os turnos de interacção até que ela deixe de iniciar movimento.

Dar atenção a qualquer movimento ou som que a Maria produza e interpretá-lo de forma comunicativa respondendo-lhe.

Associar música ao movimento

Uma vez que a Maria gosta de música, relacionar músicas diferentes com movimentos diferentes (ex: baloiçar, bater no colchão, rolar), aumentando deste modo a informação relacionada com cada música que ela ouve.

APPENDIX G

Code List of Teachers' Behavior Forms

Type of behavior	Code	Description	Example
Verbal	V	Speaks to the child only	
Verbal+movement	V+M	Augments speech with a movement that relates to the speech content.	M9 "Oh! That is good" (moves Maria's hands on the foam at the same time she speaks)
Stop movement	PM	Stops a self initiated movement	M7 The teacher stops bouncing the waterbed and watches Maria's response
Verbal -movement	V-M	Speaks and uses movement that is not related to the speech content.	A4A The teacher starts taking off Anna's bib. Talks to Anna about me using a camera. Talks to the child next to Anna. Goes away without finishing taking off the bib.
Action on object	AcO	Acts on an object	M11 The teacher taps with the foam container on the table M6 The teacher plays the bells
Starts a movement	IM	The teacher initiates a movement she want the child to perform	M6 The teacher starts rolling Mari on the waterbed, then stops an waits for her to go on rolling on her own
Caring expression	MEC	Any movement that expresses affection	M9 Rubs Maria's arms slowly

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Laughing	R	Laughs	The teacher laughs
Movement	M	Movement related to the child	A4A The teachers cleans Anna's head with a towel
Object use	OBJ	Uses an object to communicate	M11 The teacher lets Maria feel the foam container
Verbal+object	V+OBJ	Speaks and uses an object that augments speech	The teacher hands out a piece toilet paper to tell Anna to go to the toilet, saying at the same time: "here, take it. Let's put it into the toilet"
Rhythm	R	Includes a rhythmical sequence in the expressed behaviors	

APPENDIX H

Code List of Teachers' Behavior Functions

Code	Description	Example
CA	Directs attention to the activity	A10 "Look Anna, look, the hands!" trying to direct Anna's attention to her own hands while performing a movement
P	Asks questions	A4 " Anna, do you want more? More foam? Do you want me to put it in your hand?"(showing the foam container)
PR	Attempts to obtain a response	M7 The teacher moves the waterbed and watches Maria, looking for a response
INF	Informs	A6 Using hand over hand the teacher puts glue on paper.
AA	Anticipates a movement	M7 The teacher pushes Maria on her back to indicate the rolling movement
C	Comments	A6 Showing Anna a piece of paper: "Look it is pink. Your favorite color"
FA	Supports movement	M6 Repositions Maria's head so that she can see the lights
CVDP	Plays double part by saying what she thinks the child wants to say	I don't want to be cuddled I want jumping! (seizing Maria's willing to jump on the waterbed)

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PC	Expresses affection	M7 The teacher kisses Maria's hands
O	Gives directions	A6 "Anna, take the glue, take the glue" the teacher places the glue in Anna's hand.
INC	Encourages	A6 Teacher referring to Anna's having glued the paper: "Good Anna, that is good! Let's put more glue". (using hand over hand the teacher helps Anna put more glue on paper)
N	Negates	A7 Teacher refusing to bounce the waterbed: "No! No! I won't do it. You do it if you want."
I	Imitates the child	A10 The teacher repeats Anna's movements
ROT	Performs routines	M11 The teacher performs series of movements with a specific rhythm and sequence.

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APPENDIX I

Matrices of analysis of initial and final interviews

Anna's teacher

Categorias	Entrevista inicial	Entrevista final	Diferenças/comentários
Adaptação ao trabalho	Sem experiência em EE com estas crianças. Alguma experiência em ensino integrado com casos mais leves. Alguma pratica anterior com deficientes profundos em estagio Não teve formação na instituição Difícil trabalhar com A porque ela não da respostas, não se relaciona. E frustrante.		
Características de A	E capaz de discriminar pessoas. Apenas toma iniciativas para ir buscar a plasticina, não tem interesses ou preferencias	A não registou diferenças ao longo do ano. Os comportamentos variam muito de dia para dia Refere varias vezes as flutuações de A. e a inconsistência nas respostas	A funciona a diferentes níveis de desenvolvimento o que leva as pessoa a pensar que ela dá respostas inconsistentes.
Comunicação	E difícil perceber o que ela percebe Não responde por teimosia E inconsistente nas respostas Entende a linguagem oral	Por vezes era capaz de se mostrar divertida, rir-se, outras vezes fazer gestos menos próprios Parece não perceber imagens	Educadora continua a não entender as necessidades de comunicação de A

	Não da sinais de perceber Difícil saber o que ela quer Não estabelece relação com o adulto Não se manifesta Chora sem que se perceba porquê Não exprime necessidades Por vezes recusa-se a fazer algumas actividades Manifesta-se quando não quer alguma coisa Da algumas pistas de comunicação Exprime recusa Deita as coisas para o chão quando não quer Não da respostas Não comunica Não solicita o adulto	Não comunica.	
Formação	Não teve formação especializada. Acha útil ter formação especializada A informação que teve ate agora foi genérica, feita pela ECAE sobre PEIs Refere um interesse relativamente a formação que não especifica.		Não interpreta a intervenção realizada como podendo ter impacto nela

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Intervenção educativa	E difícil trabalhar com A devido ao uso de um colete que a limita em termos de movimento Ha também dificuldades na concertação de horários uma vez que as actividades externas interferem com a programação o que tem efeitos negativos, nomeadamente em termos de controle de esfíncteres. Importante a autonomia, o controle de esfíncteres	Não teve problemas em lidar com A, embora tivesse expectativas negativas no inicio. Acha que no futuro iria insistir mais em canções e historias e também no controle de esfíncteres. Sente que se dedicou pouco a ela	Parece que a Ed continua a não identificar as necessidades da A.
Relação com A	A baba-se muito e isso impressiona negativamente as pessoas A baba cheira mal A anda por vezes pouco cuidada. Condições físicas de A afastam as pessoas E difícil manter o contacto com ela.	Acha que seria necessário uma relação um a um mais frequente com A, embora não pudesse ser "sempre assim"	A impressão que dá é a de que não estaria grandemente interessada em trabalhar com A num próximo ano
Opinião sobre a intervenção		Inicialmente foi difícil um estranho na sala, mas gostou da experiência Acha que A não evolui mas pelo menos funcionou o suficiente para o meu estudo!!	Não analisa o processo, em momento nenhum, como tendo ou podendo ter tido impacto nela. O objectivo era o meu estudo. Não identifica áreas onde iria centrar-se para evoluir.
Opinião sobre a experiência este ano		Gostava de ter tido mais contacto com a TF Num próximo ano já teria mais experiência	Não identifica áreas onde poderia mudar a intervenção

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Maria's teacher

Categorias	Inicial	Final	Diferenças/comentários
Características de M	Simpática, com contacto fácil, discriminando pela voz, gosta de interacção. Parece ter alguma capacidade de raciocínio. Não gosta que lhe contrariem os movimentos	Ed refere que M é uma criança que responde sempre. Tem dificuldades em antecipar a partir da informação táctil. Ha alguma informação táctil que ela identifica, desde em conjunto com outra informação. Tem duvidas sobre o funcionamento cognitivo de Maria mas acha que este esta muito limitado pela falta de visão. Acha que a visão lhe dificulta a compreensão e que ela reage o melhor possível tendo em consideração que não vê. As respostas são mais lentas que o normal, também, segundo a Ed., por falta de visão.	Na segunda entrevista a ed. salienta aspectos importantes do funcionamento sensorial e relaciona-os com as dificuldades na aprendizagem. Parece conhecer melhor Maria
Comunicação	Fica atenta e sorri quando as pessoas falam com ela. Parece antecipar a refeição possivelmente através de varias pistas: fala, hora, cheiro, local. Não parece perceber a fala. Usa um interruptor de mesa que parece não ser muito adequado. Usa também um interruptor de cabeça que parece mais adaptado mas que não tem usado por não estar a funcionar. Usa poucas formas de comunicação: ri, mexe-se, vocaliza Exprime funções tais como prazer, desagrado, atenção. Em geral	Percebe objectos em rotinas, mas não entende tão bem se for fora da rotina. Não sabe ate que ponto ela entende a linguagem oral e acha que a visão tem influencia nisso. Acha que ela percebe "os factos do dia a dia" e que reconhece os nomes das pessoas.	Mantém as duvidas sobre a capacidade de compreensão da linguagem oral. Acha que M reconhece nomes das pessoas conhecidas. Salienta a importância da rotina na compreensão

Categorias	Inicial	Final	Diferenças/comentários
	"faz-se entender"		
Expectativas profissionais da Ed	Acha este trabalho pouco compensador, mas não totalmente frustrante, desde que não seja por muito tempo. O sucesso nestas crianças e limitado	Refere coisas que faria num próximo ano se ficasse com Maria acha que podia fazer alguma coisa com ela. Acha que podia exigir dela.	Intervenção parece ter contribuído para que a Ed. Se sinta mais capaz de responder a necessidades de M.
Experiência anterior em EE	Tinha tido experiência em regime integrado, mas nunca tinha trabalhado com casos tão graves.		
Formação	Não tem especialização. Teve formação genérica , num curso da CERCI, uma sensibilização. Quer mais formação. Acha que os contactos entre técnicos são úteis		
Intervenção educativa	Acha que M necessita de muita ajuda e beneficia de uma ajuda mão sobre mão. Beneficia de contacto com materiais quentes, que a ajudam a mexer as mãos. Acha que os objectivos para M são muito a nível motor e de desenvolvimento sensorial. Tem dificuldades em planear actividades por causa dos problemas motores	Acha importante o uso de calendários de objectos e lamenta não ter sabido como utiliza-los ao longo do ano. Sente a necessidade de individualizar a intervenção, porque "cada um é um". Acha que e necessária muita insistência para que estas crianças façam alguma coisa. Em relação a M acredita que ela tem necessidade de muita informação sensorial que necessita de muitas actividades de tipo barro, plasticna, etc.	Educadora passa de um modelo de desenvolvimento, em que o padrão normal e utilizado, para um modelo em que acha que a informação sensorial é importante mas que necessita de ser apresentado de forma individualizada.
Relação com a família	Ha pouco contacto com a família. A mãe vem pouco a escola. Ha um		

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Categorias	Inicial	Final	Diferenças/comentários
	contacto diário através de uma caderno onde geralmente se descrevem as condições gerais de M. No entanto a mãe colabora com tudo o que a escola pede.		
Apoio no trabalho		Sentiu falta de apoio inicial. Ha coisas que acha impossível as pessoas descobrirem por si próprias	
Opinião sobre intervenção		O apoio dado por este projecto deveria ter vindo no inicio do ano, era mais útil. Acha que a intervenção não teve efeitos a nível da relação afectiva com M que já estava estabelecida. A partir da intervenção, iria diminuir a insistência na relação afectiva e aumentar a exigência em relação a M. estruturaria melhor o trabalho, usando calendários. Com a informação recolhida já teria "razoes para trabalhar". A informação dada foi muito útil e permitiu-lhe ter ideias sobre como trabalhar.	A intervenção parece ter respondido a alguma necessidades da Educadora.
Papel da instituição		Foi muito bem recebida na instituição, mas sente que ha pouco trabalho conjunto. As terapias não se integram no trabalho da classe Ha pouca interacção e isso criou-lhe dificuldades iniciais, quando teve que planear a intervenção para o grupo. Como não conhecia as crianças, a planificação que fez era irrealista.	Difícil perspectivar o trabalho quando não se tem conhecimentos, nem experiência, nem apoio organizado na instituição

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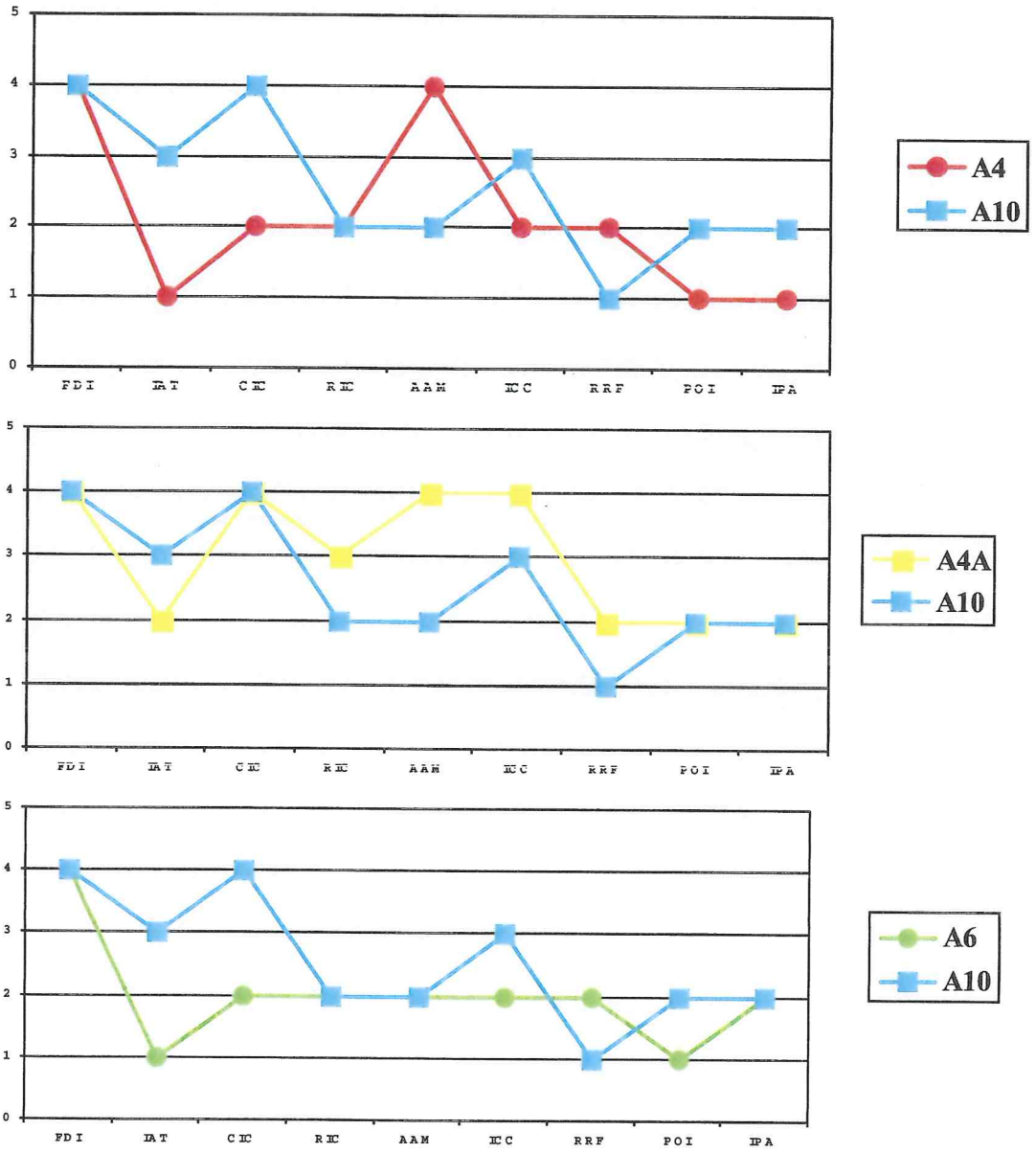
APPENDIX J

Modal values of pre and post intervention sessions

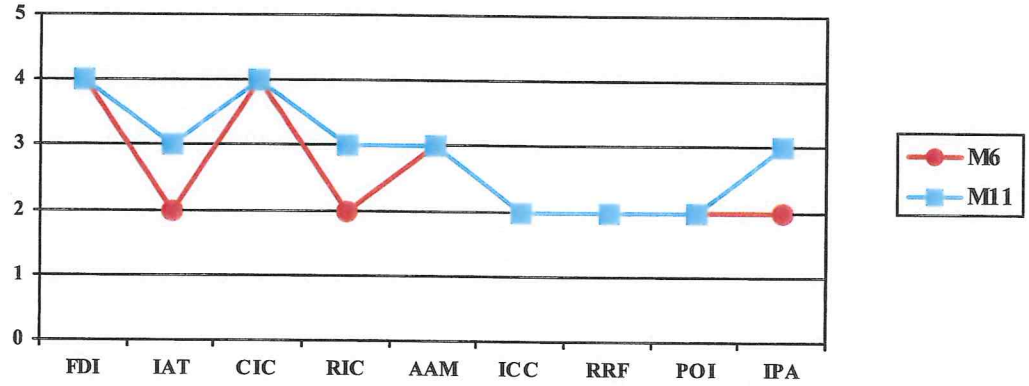
Anna

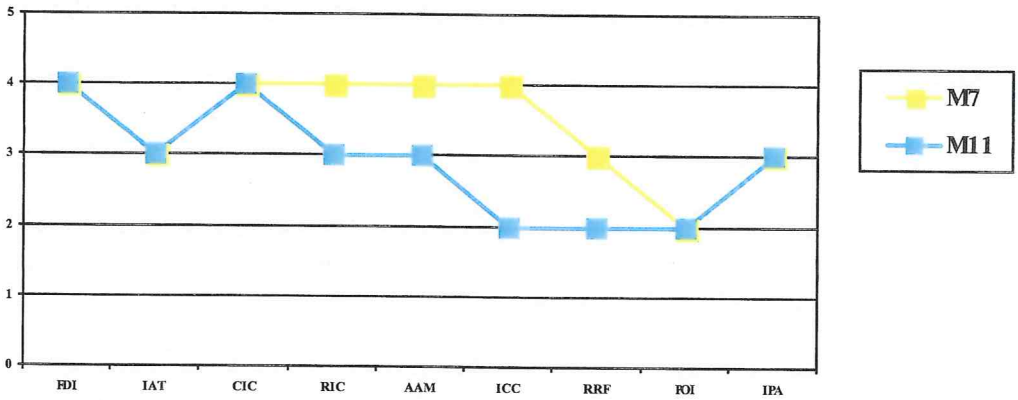
Modal values of each pre intervention session (A4, A4A, A6) compared to modal values of the post intervention session (A10) (Legend on the next page)

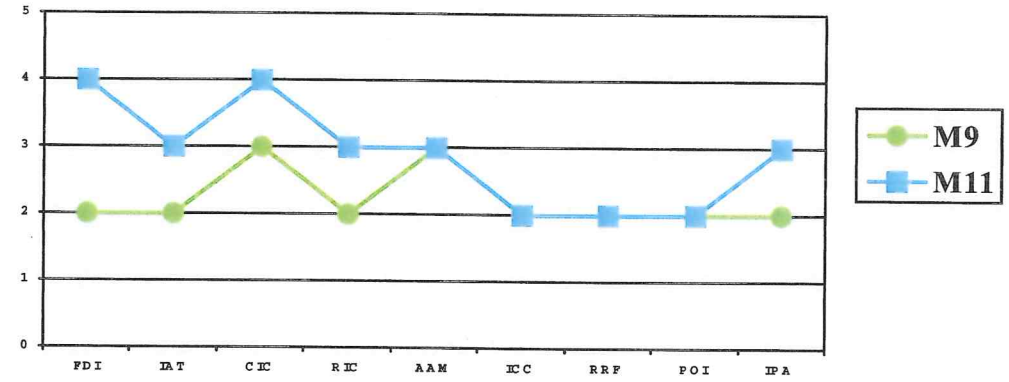


Maria

Modal values of each pre intervention session (M6, M7 and M9) compared to modal values of the post intervention session (M11)







Legend: FDI-Activity facilitates Interactions; LAT-Teacher includes turn-taking; CIC-Child initiates communication; RIC-Teacher responds to child initiation; AAM-Enjoyable and motivating activity; ICC-Teacher interprets child's behavior as communicative; RRF-Teacher paces interaction; POI-Teacher misses opportunities for interaction; IPA- Interaction provides opportunity for learning

APPENDIX K

Summary of results

Remarks/ Research questions	**Anna**	**Maria**
Remarks concerning observed activities (From participant observations)	Not functional Not age appropriate Not motivating Not supported No anticipation No means-end No learning opportunities. Only occasionally does the teacher act on a one on one interaction No diversified opportunities to learn about the world	Not functional Not age appropriate Sometimes the child is motivated by the interaction and not by the activity itself No learning opportunities involved No clear goals to help child understand what she is supposed to do Including a lot of one on one interaction. Maria gets individual attention. No diversified opportunities to learn about the world.
Remarks concerning teacher/child communication (From participant observations)	Teacher does not consider communication as a goal in education (see questionnaires) Teacher believes that speech is the form to use when interacting No knowledge of other ways to communicate. Anna's looks do not stimulate people to interact with her. Teacher's expectations about Anna are low (see interviews) People do not understand her. (inconsistency) Her facies of a grown up little woman leads people into assuming that she knows what she does not know. When she does not perform she is said to be stubborn. (Scattered skills: good at something at higher levels leads people to assume she	See questionnaire (teacher's expectations) Usually responds to Maria's behaviors, but without stimulating turn taking. These responses are comments (pretty much what mothers do to young babies at a prelinguistic level. The teacher does not know how to communicate with Maria (she mentions it in the last interview) Interactions are kept at a basic communicative level (no attempts to increase learning) Messages with no learning content

Remarks/ Research questions	Anna	Maria
	can do more than actually she does) Inconsistency of her responses discourages people. (Learning problems?) Messages exchanges have with no learning content (exception session A6) Slow child that probably needs more time to develop interaction. Delayed responses that are left unnoticed by the teacher	Maria is a smiling girl, who reacts to people talking to her. That probably helps people to react to her. We have seen in our practice that children who have social interactive skills are usually more responded to than the ones who are not. there are no specific communication strategies that meet Maria's needs.
Answer to question #1 Child forms and functions	Non verbal forms. Smiles, cries and movements. No speech No intentionality detected. Behaviors comprise performing of actions, expressions, responses to manipulation, attention, expressions, movements and sounds Anna does not show intentionality - It is possible to imply request for more, request for information, negation, in some of her behaviors She likes tactile information. Responds to objects and gestures Does not answer speech	Smiles, head movements and arm movements. No speech. The type of behaviors expressed seem to relate to the nature of the activity and to Maria's positioning Non verbal forms. Mostly movements, smiles, vocalizations. Head movements, eye movements, arm movements. Maria requests for more, expresses displeasure, refusal.
Answer to question #2 teacher forms and functions	Speech and movement are the most frequent forms. Movement includes movements that accompany speech, (pushing her or handing over an object) Combination of speech with other forms is occasional and the teacher seems not aware of the fact that this increases Anna's understanding (see interview) Most frequent functions include commands (do this, do that) and information provision (puts paper in correct position after Anna moved it)	Speech is the main form of communication. The teacher seems to be unaware of the use of other forms. The teacher uses mostly speech or a combination of speech and movement. In session M11 she also uses combinations of objects and movement. Her most frequent functions are comments and searches

Remarks/ Research questions	Anna	Maria
		for a response. In A10 there is also routine based movements that belong to a sequence of movements created. Teacher implies internationality: comments, requests questions, refusals No combination of speech with concrete forms before intervention. Use of tactile clues after intervention. The teacher thinks that she anticipates routines, probably from clues. She might understand names. The teacher also says, in the initial interview, that Maria understands better if tactile information is combined with other information such as speech and routines.
Answer to question #3 Turn taking	Anna's participation increases in one on one interactions She can take turns She asks for a movement to continue by bringing herself close to the source or touching it. We observed two moments of turn taking in sessions A4a and A6, during which teacher and child influenced each other to continue a kind of "movement" dialogue. Other moments of turn taking were not as timely synchronized. There were two types of turn taking situations: time ruled and content ruled. Time ruled turn taking are situations in which there is a synchronic and rhythmical interaction Ex: in session A4A Anna playing with the teacher before moving on to the bathroom.	In participant observations we noticed some alternating turns between teacher (or teacher aide) and child. Still, these are interactions with little content, only with a timing that suggests the adult waits for a response and them goes on. It is mostly rhythm and movement directing the interactions. Often the teacher does not imply internationality or the internationality implied is not taken into consideration in the new turn It should be noted that the content of messages is not always clear. As in Anna's case, we noticed many situations in which there was no content in particular. The

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Remarks/ Research questions	Anna	Maria
	Content ruled are situations in which the content of the activity defines turns, such as during A6 "teacher gives Anna a piece of paper. Anna picks it up. Teacher points to the place where she should put the paper. Anna puts it there". Time here is not as crucial for interaction as in time ruled situations. It is hard to define these as real turn taking because of Anna's lack of communicative intention. Teacher and child engaged in turn taking in sessions that varied in length. The length of interactions seems to mostly depend on: proximity, purpose of the activity, and response from the child. Proximity between teacher and child seems to play a role in the way teacher interacts with Anna. They do not interact when the teacher is far from Anna, such as in A4. Teacher thinks Anna does not interact Teacher does not have training in identifying potentially communicative behaviors as a way to start interaction Teacher does not identify moments of successful turns as opportunities to improve interaction. Teacher does not trust herself to be able to work with these children? (Last interview) Teacher thinks that she should have one on one interaction but cannot provide for it. Judges' opinion is that there was no interaction on A4 A4A and A6. There was	way both teacher and Maria kept interacting was a very basic one, although the teacher gave voice to the child's behaviors. Still, these were mostly playful situations, and not exactly conversational ones. There was no conversation, just turn taking play. Basically an emotional interaction. Judges disagree that there were turn taking situations in two of the videotaped observations (M6 and M9). We believe this has to do with the length of interactions that were shorter in M6 and M9. In those sessions most interactions were composed of one to five turns. In M7 and M11 there were longer interactions leading to a very long one in M11 (92 turns) Still, judges only somehow agree that there is turn taking in these sessions. D value for these responses is, 0,309 in M11, which is significant at 0.05, and 0, 2 in M7 which is not significant. So, turn taking is not clear to judges, as they agreed on "not being sure" in session M11. In session M7 the "somehow agree" response is not significant which means that probably judges did not manage to identify turn taking (?). If we compare these results with the results of systematic observations, we see quite a lot of turn taking in the

Remarks/ Research questions	Anna	Maria
	interaction in A10, but with moderate results (somehow agree) The short moments of close interaction seen in A4A and A6 were not valued by judges to consider turn taking in those activities. In fact these are very short moments.	session A7. But, again, it was for a shorter period of time than in A11. Altogether we can say that although there are turn taking opportunities, these are not enough to create a conversation. The reason why this is not happening has to do with lack of topics of conversation.
Answer to question #4 Behaviors that teachers respond to	"Misbehaviors" Behaviors that do not match the activity Behaviors that the teacher expects her to perform In sessions A10 we saw the teacher imitating Anna. That gave way to a turn taking interaction. The teacher stresses Ann's inconsistent behavior, and that she does not respond. The teacher does not respond to Anna's behaviors as potentially communicative	Cry, vocalizations, laughs, and movements of the whole body. Hard to figure out if some movements are just spasticity or coordinated movement. May be the teacher has the same problem. The response is usually a spoken one. When Maria cries, there are also responses attempting to change her positioning, assuming she might be uncomfortable. Maria gets in fact her behaviors responded to through speech. Usually responses are just comments and there are no attempts to create longer conversations.
Answer to question #5 missed opportunities	Teacher does not interpret Anna's behaviors as potentially communicative. Her attitude is more of looking for Anna's responses than to look at behaviors that might be considered communicative Teacher expects Anna to react to speech. She does not expect Anna to communicate. The teacher misses often opportunities for communication.	The teacher acknowledges Maria's behaviors as communicative The teacher responds to Maria's behaviors, still does not expect communication to move further. She simply meets Maria with a response, much in the same way mothers do with young children, interpreting but not moving

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Remarks/ Research questions	Anna	Maria
	We noticed a decrease in the number of behaviors the teacher did not respond to. We think she misses opportunities for communication for several reasons. - Does not interpret behaviors as potentially communicative - Anna's non activity diminishes teacher's response to her - The teacher is busy with other children - Anna needs one on one The teacher thinks Anna does not communicate- The teacher does not expect Anna to communicate. Does not treat her as a communicative partner. Teacher does not have preparation in the area of communication with children who are a t a prelinguistic level. Anna needs one on one interaction. Judges agree that the teacher misses opportunities for communication. No significant differences shown in A10, the post intervention session. Judges still think the teacher misses opportunities NOTE: Need to redefine what is an opportunity for communication. Yes, it is any behavior the child exhibits. But are we going to respond to every behavior' if not, how do we select it?	interaction forward. This makes sense in the case of babies, and mothers slowly move forward into extending communication, but it is not enough for a 8 year old child who, despite 8 and because of) her handicaps needs to have people interact with her to in order to make the world around accessible and provide for learning about it. The teacher recognizes that there is a lot to do about communication that she was not aware of. She thinks that with more learning on her part communication can be improved and by doing that Maria can be asked to participate more in activities. NOTE: Missed opportunities for communication were considered to be behaviors that were not responded to by the teacher. We believe that there are other ways to miss opportunities for communication, such as not pacing interaction to provide for learners responses, not using communication to talk about activities, not including information concerning what is being done; not moving forward in responding to the child's behaviors in terms of content; basically not including meaning in interactions, leaving it as a basic emotional interaction. No new

Remarks/ Research questions	Anna	Maria
		information included. Leading to no learning Judges do not consider that session M11 has less opportunities missed. The question "do teachers miss opportunities for communication" was responded with a mode value for that session of 4 (agree). D value for this item is 0.509, which is significant at 0.01.
Answer to question #6 Teacher's expectations about communication.	The teacher gives non coincident responses: Anna understands speech She thinks that Anna does not want to respond. Anna gives no signs of understanding people talking to her Anna did not change throughout the year Still: In A10 we saw the teacher imitating the child. This has some potential for communication. The teacher uses imitation to interact with Anna- Could that means that the teacher has more expectations about Anna? Or that she just did that on that particular session? Informal conversations with the teacher at the end of our stay led us to believing that the teacher does not have any increased expectations…. Still she acts differently. This could be picked up and turned into a training opportunity.	There was a decrease in the number of non-responded behaviors in the post intervention session. The teacher believes that intervention was useful and would have liked it to happen in the beginning of the year.

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Remarks/ Research questions	Anna	Maria
	The teacher does not often initiate interactions with Anna. (Participant observations) The teacher thinks Anna does not communicate. She thinks she understands speech.... Does not have expectations about her own work with Anna. In the final interview the teacher mentioned that Anna did not change her communication behavior She would like to have more support from the SLT in the future	
Answer to question #7 Does teachers miss less opportunities for communication after intervention	There was a decrease in the number of nonresponded behaviors in the post intervention session. The teacher believes that intervention was useful and would have liked it to happen in the beginning of the year. An analysis of the same item "missed opportunities for communication" reveals that judges do not consider that session A10 has fewer opportunities missed. Likert results show a D value for this item of 0.523, which is significative at 0.01.	

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Remarks/ Research questions	Anna	Maria
Answer to question #8 Does intervention improve interactions	Analysis of post intervention sessions raised questions concerning the effects of intervention in the quality of interactions Judges' opinions on the Likert scale related to teacher child interaction show that differences between pre and post intervention sessions are not relevant. See modal values in Appendix 10	Analysis of post intervention sessions raised questions concerning the effects of intervention in the quality of interactions. Judges' opinions on the Likert scale related to teacher child interaction show differences between pre and post intervention sessions that are not relevant. See modal values in Appendix 10

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APPENDIX L

Final reflections and synthesis

What learners need	**What learners in this study have**	**Why does it possibly happen**	**What changes need to be made**	**Difficulties expected**	**Limitations of this analysis**
Access to the world through diversified experiences	Limited opportunity for normal life experiences Limited access to information Fragmented information as a result of both sensory and motor impairments	Disabilities reduce opportunities for experience in general Environment does not offer alternative organized opportunities School does not compensate for that General lack of belief that there should be an investment in this population Belief that whatever needs to be done is someone else's job.	Increase opportunities for meaningful experience in diversified environments Increase knowledge about how do these learners learn Look for alternatives. It may be the case that everything we have said about normalization and inclusion does not totally serve this population. More awareness raising	People without specific training tend to accept it as a fact that children with multiple handicaps do not learn Sensory and motoric limitations create ways to access information that are not well known School administration does not consider this population as high priority Services with highly specialized staff are expensive	Number of cases studied reduce possibilities for generalization We are bringing into the discussion common ground knowledge from practice in the field.

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What learners need	What learners in this study have	Why does it possibly happen	What changes need to be made	Difficulties expected	Limitations of this analysis
Communication opportunities that meet symbolic levels and unique needs	Speech as the main form of communication No attention to scattered skills Lack of age appropriate functional opportunities for communication Lack of experience being "talked to them" Lack of interaction	Teachers assume that as long as children can hear they should understand speech Teachers do not know other ways to communicate with them Teachers do not consider communication as a central aspect of learning for this population. Teachers do not have specific training in the area	Gather more knowledge on the impact of combinations of disabilities Develop teacher preparation models, so that teachers working with this population have specific training in prelinguistic communication and how to embed communication in school activities More research in the area of communication at prelinguistic level with learners with multiple disabilities	Not all teachers are "born to communicate" Training does not always solve communication problems Communication takes long. Communication is usually effortless. In the case of interactions with learners at a prelinguistic level, particularly if they are not infants any more there is a need to continuously monitor one's behavior when communicating. Not everybody can do that, particularly without training	Pre-requisites for being a "good communicator" were not defined We don't know what is a good model for communication with these learners The need for context to be present in order to clarify content is an issue. Analysis of interactions that lack meaningful contexts do not provide a clear view of learners' communicative abilities
Tailored approaches that take into account specific learning ways and functional needs	Kindergarten like activities Preschool teachers (Children are aged	Use of developmental approaches that consider children's "mental age" as the basis for choosing what to do in school	Schools need to have a policy to work with these children. Expertise in schools on how to adapt curricula	Small population that might not get necessary attention Lack of expectations putting back decisions	We don't know exactly what to expect from this population The studied cases are not a representative sample of the

What learners need	What learners in this study have	Why does it possibly happen	What changes need to be made	Difficulties expected	Limitations of this analysis
	ten) Lack of meaningful activities that provide for learning opportunities	No knowledge of alternative functional approaches Low expectations on what these children can do	School need to have goals for this population	Financial issues (it is expensive to provide good attending of these children)	population and of the national context in which learners with multiple disabilities are educated

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