

## Adaptações do sistema de comunicação por troca de figuras no contexto escolar\*\*\*\*

### Adaptation of the picture exchange communication system in a school context

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#### Abstract

Background: alternative communication. Aim: to evaluate the efficacy of the adapted Pecs and Picture Communication Symbols (PCS) in the communication of a child with cerebral palsy. Method: the participant of this study was a 9 year and 10 months old girl, with athetoid quadriplegia. All stages of the adapted Pecs were applied (Walter, 2000), using the PCS pictures (Johnson, 1998), associated with the functional curriculum proposed by LeBlanc (1991). An experimental AB Design was used in order to test the procedures. Results: the subject was able to pass through all of the adapted Pecs phases and to use her communication board in school activities. Conclusion: the adapted Pecs proved to be effective in improving the subject's communication abilities.

**Key Words:** Cerebral Palsy; Alternative Communication; Communication Barriers; Speech Language Pathology.

#### Resumo

Tema: comunicação alternativa. Objetivo: avaliar a eficácia do Sistema de Comunicação por Intercâmbio de Figuras (Pecs-Adaptado) e do *Picture Communication Symbols* (PCS) na comunicação de paraplégico cerebral. Método: participou uma menina de 9a e 10m, com quadriplegia atetóide. Aplicou-se todas as fases do Pecs-Adaptado (Walter, 2000), usando figuras do PCS (Johnson, 1998), tendo como programa o currículo funcional (LeBlanc, 1991). Utilizou-se o delineamento experimental AB, tendo "o sujeito como seu próprio controle". Resultados: a participante passou por todas as fases propostas e usou sua prancha de comunicação nas atividades curriculares escolares. Conclusão: o Pecs-Adaptado mostrou-se efetivo para melhorar as habilidades comunicativas e escolares da participante. **Palavras-Chave:** Paralisia Cerebral; Comunicação Alternativa; Barreiras de Comunicação; Patologia da Fala e Linguagem.



## Introduction

Alternative communication is a clinical approach which proposes to compensate temporarily or permanently for the difficulties of individuals with severe communication problems due to incapacity or disability (Jensen, 2000; Clarke et al., 2001; Downey & Hurting, 2003). Many studies have presented the efficacy of the use of alternative communication to improve the communication of persons with special needs (Basil et al., 1994; Watson, 1995; Boose & Stinnett, 1999; Bondy and Frost, 2001; Liddle, 2001; Sanchis, 2001; Vasconcelos, 2001; Charlop-Christy et al., 2002; Kravits et al., 2002; Pires & Limongi, 2002; Santos & Marquezine, 2003).

The Picture Exchange Communication System is an alternative that was described by Frost & Bondy (1996) as a training manual for alternative communication for the progressive increase of interpersonal communication skills, principally for persons with severe communication difficulties. It was developed at the Delaware Autistic Program and initially utilized with autistic children who did not communicate orally (Bondy & Frost, 1994). This system of figure exchange is applied by the presentation of phases, each of which is composed of specific objectives, environmental arrangement, training instructions and procedures (Frost & Bondy, 1996), which can be used individually or in groups, in various places such as at home, the classroom or in the community. Its principal advantage is with respect to its low cost (Bondy & Frost, 1994; Frost & Bondy, 1996).

The Picture Communication Symbols System (PCS) proposed by Johnson (1980; 1998), is composed of 3000 figures that express a great variety of words used in daily activity situations and practices. It was created to address the needs of individuals with communication alterations. For its utilization, visual acuity as much as visual perception must be taken into consideration, because these both these skills enable the verbally disabled to identify the desired symbol, as well as being of fundamental importance to the existence of communication partners as facilitators who create, maintain and organize communication situations.

The speech skills that the individual may have or come to present are not inhibited, because this system fosters the elimination of possible existing tension in the act of communication, making oral emission possible accompanied by the indication of the symbol desired. This system possesses

symbols with simple designs whose meanings are easily recognized, being divided into categories denominated: social, persons, verbs, descriptors, nouns and miscellaneous. These categories are based on the function of each word and purpose of ordering the words appropriately (Johnson, 1980; 1998). The Pecs system uses the figures proposed by PCS.

In Brazil, Pecs was described, adapted and standardized by Walter (1998; 2000) and obtained positive results. In the 1998 study, Walter carried out procedures for the adaptation of the Pecs system for Brazil. The study presented by Walter (2000) had the objective of evaluating the effects of the adapted Pecs with the PCS figures applied to the context of the natural functional curriculum. In this study the author made adaptations for the utilization of Pecs and applied the procedure to four autistic individuals, with training sessions and data collection being accompanied for two years. The application involved two phases, baseline and intervention, with an AB Design. The results show the effectiveness of these procedures in the process of communication, which may have favored the inclusion of the participants in the school environment, family and community.

Cerebral Palsy is defined as an encephalitic lesion sequel, which is characterized as a permanent condition affecting, but not invariably, muscle tone, posture and movement, which appears in early childhood and is not only a directly secondary to this non-evaluative encephalitic lesion, but also influences neurological maturation (Badawi et al.; 1998; Miller, 2002).

The basic symptoms of cerebral palsy are characterized by motor difficulties, which develop over time, causing delays or interruption of sensory motor development, insufficient postural reaction mechanism, the presence of reflexes in epochs at which they should have already been inhibited, alterations in muscle tone and inability to make movements (Lepage et al.; 1998). The clinical condition of cerebral palsy is as variable as the individuals with cerebral palsy because it is related to innumerable variables, notable among which are: the anatomical site of the cerebral lesion, the part of the body affected and the influence on neurological maturation.

In atrophic cerebral palsy, the sequel is related to the involvement of the extra-pyramidal system that favors the appearance of involuntary movements, muscle tone fluctuation and delayed

psychoneuromotor development with the retention of primitive reflexes. In athetosis, the involuntary movements are slow, smooth and contorted which compromises the distal muscles by dysynergy with the opposite muscle groups (Badawi et al., 1998; Miller, 2002). The face musculature is also compromised by involuntary movements, causing difficulties in oral expression and oropharynx disorders (Miller, 2002). As to the development of language and cognition, the expectation is that this patient will not present great alterations, but these alterations, however, may occur in various degrees (Badawi et al., 1998).

Considering that cerebral palsy sequel cause primary motor alterations, which interfere in speech communication, the utilization of alternative communication methods is fundamental. For this reason, this study was designed to evaluate the efficacy of the use of Adapted Pecs and PCS in the communication of a girl with athetoid cerebral palsy in terms of functional curriculum.

## Method

The project was approved by the Research Ethics Committee of the Federal University of São Carlos under Protocol No. 021/2002. After the parents had agreed to give to allow their daughter to participate in this study, and had signed a Free and Informed Consent form, they were invited to participate in the Functional Vocabulary Selection that would be utilized during the procedures. They were to choose five items of preference or interest for each of the following categories: food preferences; beverages; toys or objects of interest; games and play; places and known persons.

The participant in this study was a nine year and ten month old female child enrolled in a special school maintained by the Association of Parents and Friends of Exceptional Children.

The participant had been given a diagnosis of quadriplegic athetoid cerebral palsy on the institution's medical chart and did not communicate by speech. The following evaluations were done: complete hearing test: presenting normalcy; vision testing which claimed estropia and a psychological evaluation which scored 58 on the Columbia, classifying her as presenting moderate mental disability. However, the psychologist's report stressed the difficulty the participant had in doing the test due to motor alterations.

The Adapted-Pecs (Walter, 1998) was utilized in association with the PCS figures relating alternative communication to functional curriculum

developed by LeBlanc (1991). This article discusses the Adapted-Pecs procedure and not the functional curriculum.

The data collection occurred during the school day period of routine daily activities, which are part of the program offered by the Association of Parents and Friends of Exceptional Children (APAE). The intervention sessions were planned to occur during mealtimes, speech therapy and classroom activities.

The participant was submitted to an initial evaluation correspondent to the baseline sessions. Following this, training of the Adapted-Pecs (Walter, 2000) was structured to address the necessities of the child with cerebral palsy.

The 24 cm x 35 cm communication board was made of wood with velcro glued to the boards and the figure cards. The figures were initially 8 x 8 cm in size and were later reduced to 4 x 4 cm.

The communication trials (1 to 10) were registered for each figure card, signifying the number of trials needed to train each figure. Each time the figure was exchanged for the desired item, the participant received points from 0 to 3 in accordance with the level of assistance received. At the end of the session, total points were registered, and total trials and total successful trials were converted into percentages to obtain the performance of the participant for that session.

The point scheme followed the criteria below for all phases:

- . unsuccessful trials = zero (0) points;
- . trials with physical assistance = one (01) point;
- . trials with verbal assistance = two (02) points;
- . trials with no assistance = three (03) points.

The answers were noted in accord with the assistance received and summed at the end of the day for a descriptive analysis in absolute and relative numbers.

The data were noted during the intervention activity and all sessions were filmed to be used for the inter observer reliability indices. The videos were watched by two observers (rehabilitation professionals) and the calculation of reliability was done. The index of reliability was analyzed by the point-by-point technique, or that is, the points for each observation were verified for each trial in 25% of the sessions, chosen randomly and respecting the characteristics of each step of the procedure. The indice of reliability was calculated by dividing the number of agreements with the sum of disagreements and agreements and multiplying the

result by 100 following the formula proposed by Hersen and Barlow (1982). Data considered to have reliable validity were those with a minimum of 75% agreement. The mean percentage of the registers of the participant was 95%.

The observations of the procedures, materials and academic content, physical context of the classroom and informative content transmitted by means of the motor responses made with the figure cards were the object of a general synthesis for all registered sessions.

An AB research design in which “the subject himself is the control” was used and consists of two phases: baseline and intervention. (Sidman, 1960; Tawney & Gast, 1984). This design does not require statistical analysis, only visual inspection, that is, a visual analysis by means of graphs which show the effects of the intervention, when compared to the performance of the participant in the baseline phase.

In the baseline phase, the figure card was matched to the corresponding object and without offering any type of assistance, the participant was asked individually if this is what she wanted. In this phase, the objective was to verify whether the participant could use the exchange procedure to communicate. Once the baseline was established, the intervention phase was initiated.

The intervention was divided into five (5) sub-phases of Adapted PECS proposed by Walter (2000), with specific adaptations to facilitate the utilization of the cards by the participant. The phases are described as follows:

**Phase 1: Learning to make the exchange.** In this phase, each participant should take, push or point to the figure, indicating the item of interest and can receive physical assistance to point to the desired item (figure card). This phase extended until no physical assistance was necessary to indicate the figure. The participant could receive social reinforcement such as: “Very good, I understand what you want!”. In training, each figure was used once.

**Phase 2: Increase the spontaneity.** In this phase, using an auditory stimulus (a rattle, for example) as a aid, the participant should get the attention of the interlocutor to initiate the communicative interaction and make their request by exchanging the desired figure to indicate their need.

**Phase 3: Discrimination of the figures and reduction of their size.** In this phase, denominated 3a, the

work of discriminating between two figures measuring 8 x 8cm was begun, one figure being of great interest and the other irrelevant. The participant should look at and perceive the difference in the figures to make her request. After obtaining 100% recognition, Phase 3b was begun, offering the figures in the 4 x 4cm size, again one being of great interest and the other irrelevant, to certify that the smaller figure had been recognized. In this phase the family was oriented to collaborate in the process by taking the communication board home and taking on a role of great importance by continuing the training at home. It must be noted that this data was not collected in a standard manner, that is, an accompaniment was not made of the use of the communication board at home, because this was not the principal intention at that time. However it was observed that the family presented interest in the process and this form of communication. To improve visualization, the board was positioned vertically at a 45 degree angle and attached to the participant’s wheelchair.

**Phase 4: Forming sentences.** In this phase, began the use of the figure denominated “I want” + the desired figure, requiring the use of a resource called “Phrase-Frame” (Walter, 1998). This adaptation was made utilizing a wooden board measuring 5cm wide by 40cm long with velcro strips glued to both sides. In this instance, the participant should remove the desired figures from the communication board and place them on the “Phrase-Frame”, forming the phrase “I want” + the desired stimulus. Verbal assistance was given when necessary. With a phrase formed, the participant should submit the phrase-frame showing their desire. As the process evolved, the verbal help was withheld to make the participant formulate their phrase spontaneously. Lastly, figures such as, “I like”, “I have”, “I see”, etc. were utilized.

**Phase 5: Increase vocabulary.** In this phase, the figures that contained concepts such as, for example, notions of color, shape, size, etc., figures that expressed feelings and figures for concepts from the academic curriculum were introduced.

The sessions to register the performance of the participant in the phases of the Adapted-Pecs (Walter, 2000) were carried out during the school week, in accordance with the frequency of the participant’s school attendance during the school year. In the third phase, the sessions recorded and use of the Adapted-Pecs moved to other activities

and environments in the school, in accordance with the daily planning for the classroom, such as help with pedagogic activities set by the teacher and in other areas of the school, in physical education classes, in interactions which took place in the park and music activities. The data collection had duration of nine months. Note that the criteria for moving on to a new phase was linked to obtaining 100% correct responses. However, if there had been absences during the week, the procedure was reapplied at the same phase.

**Results**

The performance of the participant in the training phases of the Adapted-Pecs, the level of assistance given to allow the request to be made in an independent manner, the observations and the reports about the communicative changes that occurred through use of the alternative communication procedures utilized will be presented.

Figure 1 shows the performance in the baseline phase and in each of the intervention phases that the participant managed to achieve through use of the Adapted Pecs.

In the baseline phase (sessions one, two and three), the participant was unable to make any solicitation, merely looked at the figure and took it, but did not present any use of the figure to manifest her desire as a communicative function. From these behaviors with the figures, the responses can be observed to be unsuccessful as the objective was to verify if the picture exchange as a form of communication could be performed. In the subsequent phases, it was possible to observe the effective utilization of the alternative communication resource in each of the phases.

In Figure 2 the type of assistance given to the participant during the baseline and intervention phases are described.

As can be verified in the baseline, no type of response that demonstrated a communicative intention was observed (sessions one, two and three).

At the beginning of the intervention phase (sessions four to ten) the participant was oriented orally about the manner in which the exchange should be made, that is, she could take the card, remove it and give it. The presence of unsuccessful responses and appropriate responses with physical assistance can be verified. The baseline sessions through to the seventh session (of phase one) were conducted by the researcher.

From the 5<sup>th</sup> through 8<sup>th</sup> sessions, it was possible to verify the presence of verbal assistance, which became a permanent form of assistance. In the 8<sup>th</sup> session, the teacher was oriented and solicited to carry out the training.

In the 9<sup>th</sup> session 100% of independent responses were presented. There was then a 15-day recess period. The indices of successful responses was stable in the session subsequent to the return to classes and the option was made to move on to the 2<sup>nd</sup> phase.

In phase 2 of the Adapted-Pecs (sessions 11 to 16), there was a physical distancing between the teacher and the participant and the participant was orally oriented to use the rattle when she desired to solicit something.

In the 12<sup>th</sup> session, the participant obtained 100% of responses with independence; however, in the following session, alterations in behavior were presented, such as armcrossing, movement of the head to indicate “no” as well as hiding the card in her lap.

FIGURE 1. Performance in the baseline phase and in each of the intervention phases that the participant managed to achieve through use of the Adapted Pecs.

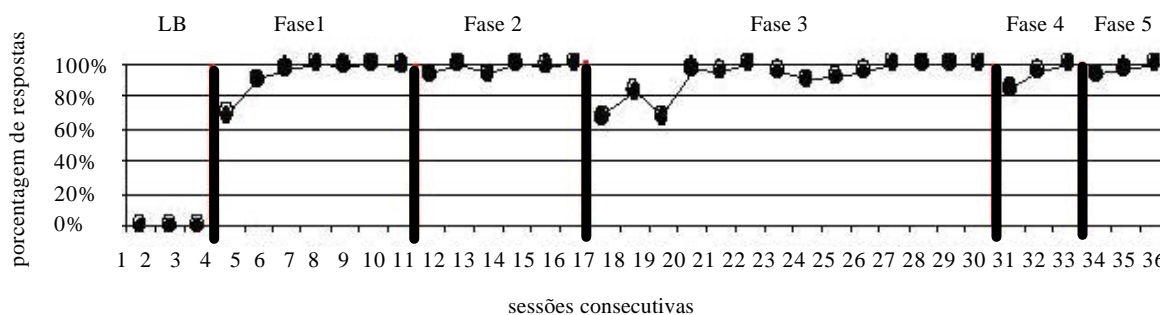
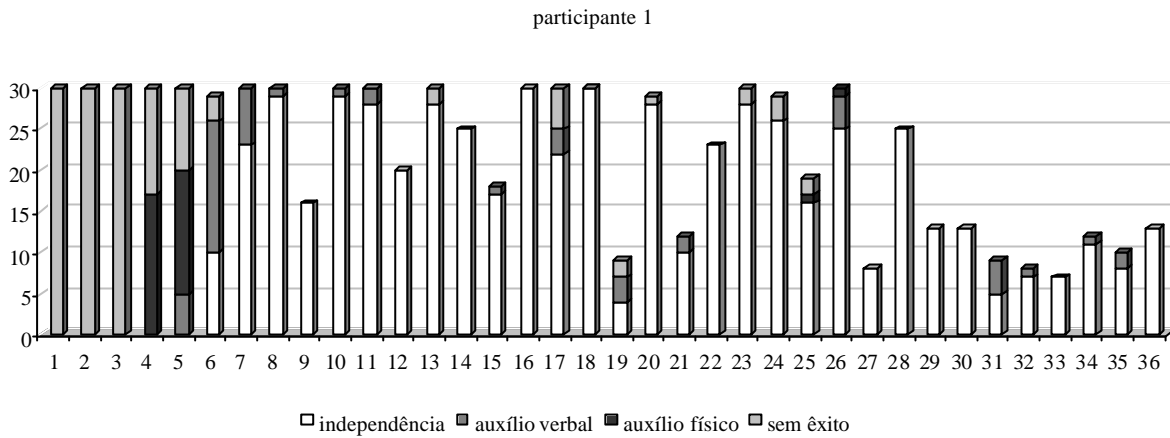


FIGURE 2. Assistance given to the participant during the baseline and intervention phases are described.



In the 14<sup>th</sup> session, guttural sounds and screams to call attention were presented, together with the shaking of the rattle. In the 17<sup>th</sup> session of the intervention, phase 3a was begun, where the participant was oriented to make a choice between two distinct figures that were on the board: shake the rattle to call the adult and make the communicative exchange. In this session, initially difficulties were presented (unsuccessful responses) such as giving the teacher two figures.

In the 19<sup>th</sup> session, the participant presented behaviors of refusal to do the communication training ( unsuccessful responses), because she wanted to change activities, did not respond to the teacher's solicitations, necessitating verbal assistance. In the 22<sup>nd</sup> session, she performed 100% of successful responses ,permitting her to move on to phase 3b.

Phase 3b began in the 23<sup>rd</sup> session. The participant was oriented that the figures would be reduced in size and new options would be added to the communication board. It was clarified that she should choose the figures on the board and shake the rattle to make the communication exchange. It must be noted that it was also considered appropriate to call the teacher by producing the guttural sounds that the participant was able to make. Phase 3b refers to sessions 23 through 30 and despite having achieved the indice for the next phase in session 28, there was a school recess and the participant was absent, and for this reason sessions were done to guarantee the criteria met, in this phase.

In the 30<sup>th</sup> session, the participant presented 100% independent responses and after this performance, the fourth phase was begun. In the 31<sup>st</sup> session, phase 4 was initiated, in which the

participant was oriented orally about how the picture exchange should be done, that is, in this phase the participant should utilize the figures "I am" and "I want" to form phrases to solicit what was desired.

**In the 33<sup>d</sup>** session, 100% independent responses were presented; meeting the criteria to move on to phase five. At the beginning of the phase five, in the 34<sup>th</sup> session, the participant was oriented orally on the way the exchange should be made, that it should be made as in phase four, with the difference that the figures which were still unfamiliar would be utilized. In this phase, new categories of vocabulary were presented and the use of alternative communication for other activities by the participant in school and at home.

## Discussion

The participant managed to achieve all of the phases of the Adapted-Pecs system successfully: The experimental design proposed in this study, having the subject as her own control, served as a parameter for evaluating the possibilities of the use of alternative communication and academic learning proposed by the school, since the participant responded to the curricular questioning solicited by the teacher, through use of the Adapted-Pecs. Sidman (1960); Tawney & Gast (1984); describe this methodology and the importance of its use for the acquisition of knowledge on the part of the participants, for having themselves as their own control.

In phase one, with the placement of the communication board positioned vertically, the participant did not demonstrate any difficulty in doing the communication training. For the

elaboration of the communicative resource, it is important that all necessary adaptations are made to facilitate the development of communicative activities by the user (Jensen 2000; Liddle, 2001; Downey & Hurting, 2003; Santos & Marqueline, 2003).

In phase two, the rattle was used as a resource to get the attention of the interlocutor, the participant made use of it without demonstrating difficulty with the inclusion of this new rule. It was observed that, from this procedure on, the participant began to use her oral possibilities to get the attention of the interlocutor, as in, for example, produce guttural sounds. It is important to note this aspect because the use of alternative communication does not impede the development of oral communication and the authors, Watson (1995); Frost & Bondy, (1996); Walter (1998); Boose & Stinnet, (1999); Bondy & Frost (2001); Clarke et al. (2001), also call attention to this fact.

In phase 3a it was possible to verify that the participant managed to make the exchange of two or more figures available on the communication board, and in phase 3b, the quantity of figures utilized for communicative exchange increased and the figures were reduced in size. The importance is to increase the communication possibilities of the users and in some cases, this means optimizing the surface on which the symbols will be placed, as in the case of the use of the communication board. (Charlop-Christy et al., 2002; Kravits, et al., 2002).

In phase four, the participant, initially utilized short phrases to solicit her desires. After three sessions, it is possible to verify that the participant managed to form phrases to solicit her desires. The objective of the proposal by Walter for the use of Adapted-Pecs (1998; 2000) was to broaden the communicative repertoire of the users. The studies by Bondy & Frost (2001); Liddle (2001); Charlop-Christy et al. (2002); Kravits et al. (2002); demonstrate that the use of Pecs fostered the broadening of the communicative repertoires of the individuals who used this system.

In phase five, the communication training was extended to other daily school and home activities. Beyond this, the teacher could use these resources

to successfully develop academic content. The functional curriculum of Le Blanc (1991) favors the exchange of information in different situations, valuing the student when the student is observed to be capable of responding appropriately to demands of the environment and collaborate with their social insertion. Basil et al. (1994); Watson (1995); Sanchis (2001); Santos & Marqueline (2003) also point to the importance of the use of alternative communication for the full development of the user, so that these strategies can favor interaction in all the environments that this individual may frequent.

Finally, it was verified that the participant with cerebral palsy responded in an appropriate manner to the stimuli provided by the Adapted-Pecs and PCS systems in the communicative activities. Other relevant aspects were the participation of the teacher who was active in the educational process by providing conditions for use of the procedures in academic activities and the participation of the parents in the process, which despite having been asked only to choose the functional vocabulary for the organization of the board, involved themselves completely in the process and participated by actively stimulating their daughter in the use of alternative communication at home.

## Conclusion

The Adapted-Pecs System (Walter, 1998), associated with the PCS figures was effective in assisting the communication skills of a child with a diagnosis of athetoid cerebral palsy. The emission of sounds whose purpose was to call attention to her, initiates communicative interactions, and request something desired, maintain a simple dialog and transmit messages.

Considering it of extreme importance that other studies be carried out with the intention of utilizing the methodology presented with other persons with cerebral palsy or individuals who present serious alterations in oral communication. Note that the need to analyze the variables involved in this methodology in order to make the necessary adaptations in its application, in order to obtain positive results.

## References

- BADAWI, N.; WATSON, L.; PETERSON, B.; BLAIR, E.; SLEE, J.; HAAN, E.; STANLEY, F. What constitutes cerebral palsy? *Developmental Medicine and Child Neurology*, v. 40, n. 8, p. 520-527, 1998.
- BASIL, C.; SORO, E.; VON TERZCHENER, S. Estratégias iniciais para la enseñanza de comunicacion aumentativa. Parte II: Niños y jóvenes com déficit expressivo y buena comprensión. Centro Balmes 21 de la Universidade de Barcelona, Barcelona, 1994.
- BONDY, A. S.; FROST, L. A. PECS: the picture exchange communication system training manual. In: CHERRY HILL, N. J. *Pyramid educational consultants, PECS Inc.*, 1994; 78 p.
- BONDY, A. S.; FROST, L. A. The picture exchange communication system. *Behav. Modif.*, v. 25, n. 5, p. 725-744, 2001.
- BOOSE, M. A.; STINNETT, T. Indirect language stimulation (ILS): AAC techniques to promote communication competence. In: ANNUAL SOUTHEAST AUGMENTATIVE COMMUNICATION CONFERENCE, 1999. BIRNIGHAM (AL), 1999. *Annals...* New York: AAC, ED 443-240- Microfiche, 1999. 10 p.
- CHARLOP-CHRISTY, M. H.; CARPENTER, M. L. L.; LEBLANC, L. A.; KELLET, K. Using the picture exchange communication system (PECS) with children with autism: assessment of PECS acquisition, speck, social-communicative behavior and problem behavior. *J. Appl. Behav. Anal.*, v. 35, n. 3, p. 231-231, 2002.
- CLARKE, M.; MCCONACHIE, H.; PRICE, K.; WOOD, P. View of young people using augmentative and alternative communication systems. *Int. J. Lang. Común. Disord.*, v. 36, n. 1, p. 106-115, 2001.
- DOWNEY, D.; HURTING, R. Augmentative and alternative communication. *Pediatr Ann.*, v. 32, n. 7, p. 466-474, 2003.
- FROST, L. A.; BONDY, A. S. *El sistema de comunicacion por intercambio de figuras*. Manual de entrenamiento. Lima, Peru: PECS Spanish Edition, 1996.
- HERSEN, M.; BARLOW, D. H. *Single case experimental designs: strategies for studying change*. New York: Pergamon Press, 1982.
- JENSEN, M. H. Augmentative and alternative communication in lopogedics. *Folia Phoniatr. Logopedics.*, v. 53, n. 1-3, p. 126-135, 2000.
- JOHNSON, R. M. *The picture communications symbols*. Stillwater, Minessota: Mayer-Johnson, 1980.
- JOHNSON, R. M. *Guia dos símbolos de comunicação pictórica*. Tradução de G. MANTOVANI, J. C. TONOLLI. Revisão técnica Nádia Browning Gill, R. BERSCH. Porto Alegre: Clik, 1998. 64 p.
- KRAVITS, T. R.; KAMPS, D. M.; KEMMERER, K.; POTUCEK, J. Brief report: increasing communication skill for an elementary-age student with autism using the picture exchange communication system. *J. Autism Dev. Disord.*, v. 32, n. 3, p. 225-230, 2002.
- LEBLANC, J. M. El curriculum funcional en la educación de la persona com retardo mental. In: SIMPÓSIO INTERNACIONAL COANIL, 1991, Santiago, Chile. *Proceedings*. Santiago, 1991. 10 p.
- LEPAGE, C.; NOREAU, L.; BERNARD, P.; FOUGEYROLLAS, P.; Profile of handicap situations in children with cerebral palsy. *Scand. J. Rehab. Med.* v. 30, p. 263-272, 1998.
- LIDDLE, K. Implementing the picture exchange communication system (PECS). *Int. J. Lang. Commun. Disord.*, v. 36, p. 395-401, 2001.
- MILLER, G. Paralisias cerebrais: uma visão geral. In: MILLER, G.; CLARK, G. D. *Paralisia cerebral: causas, conseqüências e conduta*. Barueri: Manole, 2002. p. 1-39.
- PIRES, S. C.; LIMONGI, S. C. O. Introdução de comunicação suplementar em paciente atetóide. *Pró-Fono Revista de Atualização Científica*, v. 14, n. 1, p. 51-60, 2002.
- SANCHIS, T. A. A comunicação alternativa na escola especial. *Temas em Desenvolvimento*, v. 10, n. 58/59, p. 85-88, 2001.
- SANTOS, D. R.; MARQUEZINE, M. C. Paralisado cerebral não falante, deficiência mental e tablóide de comunicação: estudo experimental. In: MARQUEZINE, M. C.; ALMEIDA, M. A.; TANAKA, E. D. O.; MORI, N. N. R.; SHIMAZAKI, E. M. (Org.). *Leitura, escrita e comunicação no contexto da educação especial*. Coleção Perspectivas multidisciplinares em educação especial. Londrina: Ed. UEL, 2003. p. 109-119, vol 3.
- SIDMAN, M. *Tactics of scientific research - evaluating experimental data in psychology*. New: Basic Books, 1960.
- TAWNEY, J. W. E.; GAST, D. L. *Single subject research in special education*. Columbus: Charles E. Merrill Publishing, 1984.
- VASCONSELOS, R. Paralisia cerebral e comunicação alternativa e suplementar: Linguagem e funcionamento. *Temas em Desenvolvimento*. v. 10, n. 58/59, p. 79-84, 2001.
- WALTER, C. C. F. A adaptação do sistema PECS de comunicação para o Brasil: uma comunicação alternativa para pessoas com autismo infantil. In: MARQUEZINE, M. C.; ALMEIDA, M. A.; TANAKA, E. D. O.; MORI, N. N. R.; SHIMAZAKI, E. M. (Org.). *Perspectivas multidisciplinares em educação especial*. Londrina: Ed. UEL, 1998. p. 277-280.
- WALTER, C. C. F. *Adaptação para o Brasil do sistema de comunicação por trocas de figuras (PECS), com pessoas portadoras de autismo infantil*. 2000. 89 f. Dissertação (Mestrado em Educação Especial) - Universidade Federal de São Carlos.
- WATSON, J. L. Improving communication between regular students and a physically impaired non-verbal child using alternative communication systems in the kindergarten classroom. In: *Master of science practicum*. Florida, Report. FT Lauderdale (F1) New University, 1995.

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