

# INTRODUCTION TO THE USE OF A TABLET FOR ALTERNATIVE COMMUNICATION BY AN ADOLESCENT WITH CEREBRAL PALSY<sup>1</sup>

## INTRODUÇÃO AO USO DO TABLET PARA COMUNICAÇÃO ALTERNATIVA POR UMA JOVEM COM PARALISIA CEREBRAL<sup>2</sup>

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**ABSTRACT:** This research aimed to evaluate the transition from communication through paperboard to communication through a tablet for an adolescent with cerebral palsy in order to verify the effectiveness of using this assistive technology resource as an alternative form of communication. The participant of this study was an adolescent with cerebral palsy who uses a paper communication board in conjunction with a folder, Velcro and word cards. A design of comparison between interventions with reversion were used with the following experimental phases: A1. and A2. Also, without intervention; B. Implementation of accessibility to the tablet; BC. Implementation of accessibility to the tablet plus the orthosis for positioning; BCD1. and BCD2, implementation of accessibility to the tablet plus the positioning orthosis and modifications in the table of support. When investigating the use of the tablet associated with the implemented resources of assistive technology the results indicated a positive data related to the teaching procedures established with the implementation of the tablet instead of the paperboard.

**KEYWORDS:** Special Education. Communication Systems. Cerebral Palsy.

**RESUMO:** Esta pesquisa teve como objetivo avaliar a transição da prancha de comunicação em papel para a prancha de comunicação no tablet para uma jovem com paralisia cerebral, tendo em vista verificar a efetividade do uso desse recurso de tecnologia assistiva como um equipamento alternativo para a comunicação. Participou do estudo uma jovem com paralisia cerebral usuária de prancha de comunicação em papel tendo como material para construção uma pasta, velcro e cartões de palavras. Foi utilizado um delineamento de comparação entre intervenções com reversão com as seguintes fases experimentais: A1. e A2. não há intervenção; B. implementação de acessibilidade ao tablet; BC. implementação de acessibilidade ao tablet somada a órtese de posicionamento; BCD1. e BCD2. implementação de acessibilidade ao tablet somada à órtese de posicionamento e às modificações na mesa de apoio. Ao investigar o uso do tablet associado aos recursos de tecnologia assistiva implementados os resultados alcançados indicam dados positivos quanto aos procedimentos de ensino estabelecidos para a implementação do tablet em substituição à prancha em papel.

**PALAVRAS-CHAVE:** Educação Especial. Sistemas de Comunicação. Paralisia Cerebral.

## 1 INTRODUCTION

Currently, Assistive Technology is recognized as a theoretical and practical area of knowledge, of an interdisciplinary nature that is part of the scope of direct access to people with disabilities and reduced mobility. It is configured as a set of practices, instruments and techniques that favor the accomplishment of daily activities, helping and potentializing the functional

<sup>1</sup><http://dx.doi.org/10.1590/S1413-65382418000300002>

<sup>2</sup> Research funding PIBITI/CNPQ/UFSCar/2015-2017.

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abilities of the individual, seeking to promote and ensure his/her autonomy and independence, with a view to broaden social participation (Secretaria Especial dos Direitos Humanos, 2007). Acting in diverse contexts, Assistive Technology proposes strategies for overcoming the barriers experienced by people with disabilities, including access to communication through the implementation of resources and alternative systems (Pelosi, 2011).

These systems and alternative means have shown effectiveness in enabling and favoring social and communication skills by promoting language development, participation in school and other environments which are necessary for the development of children and young people with complex communication needs arising from conditions such as cerebral palsy or autism spectrum disorders (Nunes, 2003; Von Tetzchner & Martinsen, 2000; Desai, Chow, Mumford, Hotze, & Chau, 2014).

With this in mind, Pelosi (2009, p. 166) proposes that Alternative Communication can be understood as '[...] an integrated group of components that includes adapted symbols, resources, strategies and techniques that will help people with occupational dysfunction to communicate and to participate in their daily activities'. Such communication may occur through figures, symbols, visual, auditory or tactile representations that are meaningfully taught to the subject (Pereira & Sampaio, 2011; Cook & Polgar, 2015).

Specifically regarding the alternative communication capabilities, there is a distinction between the types that can be implemented. They can be categorized into symbols that do not require external resources (one uses his/her own body to communicate) and symbols that require external resources (those that require instruments or equipment) such as the paper communication board or tablet software and vocalizers (Pereira & Sampaio, 2011; Pelosi, 2013, 2016).

In order for the implementation process of an assistive technology resource to occur and even for alternative communication resources and systems, Manzini and Santos (2002) operationalized the steps involved to insert, adapt and facilitate the use of the resource chosen for the educational environment, but they can be directly applied to other contexts, as shown below:

To understand the situation that involves the student: to listen to their desires; identify physical/psychomotor characteristics; to observe the student's dynamics in the school environment; to recognize the social context.

To generate ideas: to talk to users (student/family/colleagues); to search for existing solutions (family/catalog); to research materials that can be used; to research alternatives to make the object.

To choose the viable alternative: to consider the needs to be met (educator/student issues); to consider the availability of material resources for the construction of the object - materials, process for making it, costs.

To represent the idea (through drawings, models, illustrations): to define materials; to define the dimensions of the object - shapes, measures, weight, texture, color, etc.

To build the object for experimentation: to experiment in real-life situation.

To evaluate the use of the object: to consider whether it met the desire of the person in the given context; to verify if the object facilitated the action of the student and the educator.

To follow the use: to check if the conditions of the student change with the passage of time and if there is need to make some adaptation in the object (Manzini & Santos, 2002, pp. 10-11).

Thus, with the necessary care whilst making choices together with their propositions, assistive technology resources can be part of the process of implementing alternative

communication systems for people with disabilities who have complex communication needs (Manzini & Deliberato, 2006; Cook & Polgar, 2015), with an emphasis on those with cerebral palsy, the subject of this research.

Amidst the variety of alternative systems and resources and the increasing availability of technologies that allow access to alternative communication software and applications, we can see a change in how people communicate at different ages (Baxter, Enderby, Evans, & Judge 2012; Pelosi, 2013, 2016). With mobile technologies being easily accessible, together with the ease in the acquisition of alternative communication applications meant that the target public and their families that previously did not consider its use adhere to this type of communication (McNaughton & Light, 2013).

The introduction of the tablet and other mobile technologies has offered many benefits for individuals who need alternative communication, promoting greater functionality and expansion in their communicative process, whilst boosting interest in developing new features and research on how to use them (McNaughton & Light, 2013). Also, studies in the area have considered the importance of the use of technological resources in alternative communication in the sense of giving opportunity to its users who are becoming increasingly active and autonomous in their activities, contributing to the quality of communicative competence (Batorowicz, 2017).

The possibility of carrying the tablet to different locations allows its user to use it in different contexts, promoting communication in all environments that he/she frequents. Using the applications associated with the voice output of this device makes it possible to establish conversations with someone without the other person being present, assisting or paying attention exclusively to the paperboard. Thus, with this audio, the child or young person can communicate at a certain distance from his/her interlocutor, without being present in the same room or next to him/her, for example.

Because they are easy to carry and allow quick customization of the board by different people, alternative communication systems using mobile applications and tablets tend to be preferred by parents, teachers and the users of such communication (Flores et al., 2012). In addition to being an important ally in the communication of people with disabilities, Lorah, Parnell, Whitby, & Hantula (2015), in a systematic review on this subject, also point to the potentiality of the introduction of equipment such as the tablet for children with autism.

Flores et al. (2012) indicate that the use of the tablet by children and adolescents with autism or developmental disorders may even increase the communication and motivation levels regarding the use of the paperboard, reinforcing the need for research in using this technology. In Desai et al. (2014), there was an increase in communication skills and scholastic performance of a student diagnosed with cerebral palsy and autism spectrum disorder when alternative communication software was introduced through the tablet involving parents, teachers and their assistants in this process. However, the use of the tablet as with other technological resources for alternative communication should take into account the context of the user and its potential usage in all forms of communication that he/she can use it for (Pinto & Gardner, 2014; Cook & Polgar, 2015), which can bring challenges to its implementation process.

Although there is an increase in access and use of this type of communication resource, there is a need to carry out studies that demonstrate the implementation and continuity of its use after acquisition by users, investigating possible barriers and facilitators of this type of technology in daily life (Baxter et al., 2012; Flores et al., 2012), mainly at the national level.

Based on this information, this study aimed to evaluate the transition from the paper communication board to the communication board on the tablet, focusing on the process and the implementation stages of an alternative communication application for an 18 year old adolescent with diagnosed cerebral palsy, and with a view to identifying the steps of the methodology used for this transition.

## **2 METHOD**

### **2.1 ETHICAL PROCEDURES**

The study was submitted and approved by the Ethics Committee. The procedures applied are guided by the principles of the National Health Council in relation to the Guidelines and Norms Regulating Research Involving Human Beings (Resolution No. 466/2012).

### **2.2 LOCATION OF THE RESEARCH**

Practical activities were carried out at the residence of the research participant, more specifically in the living room, where those in charge provided a table and chair.

### **2.3 INSTRUMENTS FOR THE CHARACTERIZATION OF THE PARTICIPANT**

Participant Characterization Script, Gross Motor Function Classification System for Cerebral Palsy – GMFCS R & E (Palisano, Rosenbaum, Bartlett, & Livingston, 2007), Manual Abilities Classification System - MACS (Eliasson et al., 2006) and Communication Function Classification System for Individuals with Cerebral Palsy - CFCS (Hidecker et al., 2011).

### **2.4 PARTICIPANT**

An adolescent named S., 18 years old, diagnosed with cerebral palsy with IV level scores on GMFCS, IV on MACS and IV on CSCF with nonverbal and sometimes inefficient communication, although has use of the board. The participant entered school at the age of four. During the study period (February to June 2015), the adolescent attended the third grade of High School in a private school. She attended physiotherapy, psychopedagogy and psychology on a weekly basis. She used functional positioning orthosis for wrists and for both ankles due to spasticity and hypertonia. Specifically regarding the use of the board, the adolescent was introduced to this system at the end of her early childhood during specific interventions with a speech therapist and an occupational therapist.

## 2.5 EQUIPMENT

Apple iPad® – 9.7-inch device; software/application for production of an alternative communication board: licensed to use Vox4All® for IOS system; digital camera; orthosis; tip for tablet activation; inclined plane made of wood.

## 2.6 INSTRUMENTS FOR DATA COLLECTION

Descriptive registration protocol: Used for annotation of the situational observations that occurred during the intervention sessions. It aimed to understand the participant and observe her behavioral login repertoire in relation to the use of the alternative communication board.

Event registration protocol: Based on the initial observations and aimed to verify if there was a change in the participant's behaviors from the implementation of the planned interventions, the registration of the levels of help needed to teach each behavior included 6 scores, namely: 0 (does not perform); 1 (total physical tip); 2 (partial physical tip); 3 (demonstration); 4 (verbal tip); and 5 (independent performance).

## 2.7 TEACHING PROGRAM

The teaching program was based on data from phase A, in which the researcher learned about the knowledge of the login repertoire of the study participant in the realization of the activity of using the communication board and tablet domain. It is worth noting that decision-making for the intervention and implementation of resources was in accordance with the rhythm and response of the participant, making it impossible to predict all stages of the teaching program, thus adapting solely to each session according to the needs and demands presented.

The assistance procedures described in the event registration protocol were used to teach the activities to the participant. After analyzing the login repertoire and elaboration of the program, the intervention sessions started. Table 1 shows the description of the skills involved in the proposed activities.

BASIC SKILLS	DESCRIPTION
Unlock tablet.	Bring hand or fingers to the tablet and unlock the device.
Select application.	Position hand or fingers in order to select the alternate communication application.
Look at the desired icon.	Move eyes toward the tablet screen and the icon one wants to select.
Select desired icon with hand, fingers, using orthosis or tablet pen.	With the application working, use hand or fingers to point at the desired icon.
Switch icon with hand, fingers, using orthosis or tablet pen.	Move hand or fingers so that the icon is changed.
Use your hands, fingers or look to communicate through tablet.	Use hand, fingers or eyes to answer questions through the icons on the board.
Keep the tablet in the field of vision.	Follow the session by keeping the tablet in the field of vision.

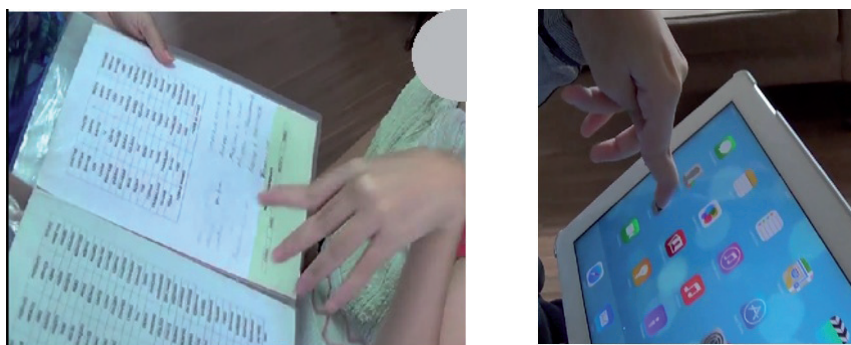
Ask questions to third parties	Use tablet to ask questions to people around.
Answer questions coherently.	Answer the questions or ask for what one wants coherently.

**Table 1.** Presentation of the basic skills contained in the evaluation protocol  
 Source: Elaborated by the authors based on Windholz (2016).

## 2.8 IMPLEMENTATION AND EVALUATION PROCEDURES

For implementation and evaluation, the teaching situations were separated as follows: 1. use of the paperboard as alternative communication; and 2. use of the tablet. The development of teaching situations was carried out at different moments with the participant, indicating the order of implementation of the following experimental phases A, B, BC and BCD. It is worth emphasizing that each letter of the experimental phases represents a procedure model, from the absence of intervention (A) or availability of assistive technology resources, to the use of resources in isolation (B) or with other resources (BC, BCD).

Experimental Phase A1: Initially, meetings were held with the participant and her mother, in order to observe how the use of the paper communication board already implemented happened. This phase allowed the researcher to become aware of the participant’s repertoire of log in when exposed to different ways of using the resource. Concomitantly, the tablet was presented to the participant without instructions or interventions so her login repertoire regarding the use of this resource was observed. From the characteristics of the participant identified with the MACS and CSCF and the demands raised by the family and the participant, the interventions that would be useful in the near future and help in the development of her autonomy were outlined. In Figure 1, we can see how the use of the paperboard for alternative communication happened, requiring assistance 100% of the time that the participant intended to communicate, since the interlocutor should hold and position the communication board and turn the pages as requested by the participant. We can also observe the difficulty in accessing the touchscreen due to the physical deformity –metacarpophalangeal joints flexion, proximal interphalangeal joint hyperextension, and the distal interphalangeal joint flexion of the fingers.



**Figure 1** - Images of the situations of alternative communication with the paperboard and use of the tablet before the implementation of the intervention

Source: Research images.

Experimental Phase B: This phase of intervention started exposing the participant to the first teaching situation, presenting the intervention program with guidelines for use of the board, which should assist in the use of the tablet (for example: alternative ways of pointing to the symbols). Then, the tablet was started with specific guidelines for understanding its functioning and alternative forms of access. Such use contemplated the access to the application that made possible the replication of the communication boards that the participant had in paper, but with dynamic interaction between symbols and themes.

To enable the participant to physically access the tablet independently for image selection, two positioning orthosis were proposed to accommodate a touch-trigger pen. The first one in the shape of the number 8 provided stabilization of the proximal interphalangeal joint, allowing its flexion (Schaf & Silva, 2003). The second orthosis promoted the blockage of the same joints, but its format consisted of a splint positioned on the palmar part of the finger and stabilized with Velcro. The participant opted for the use of the second proposal, with the fixation of the pen adapted for activation (Figure 2).

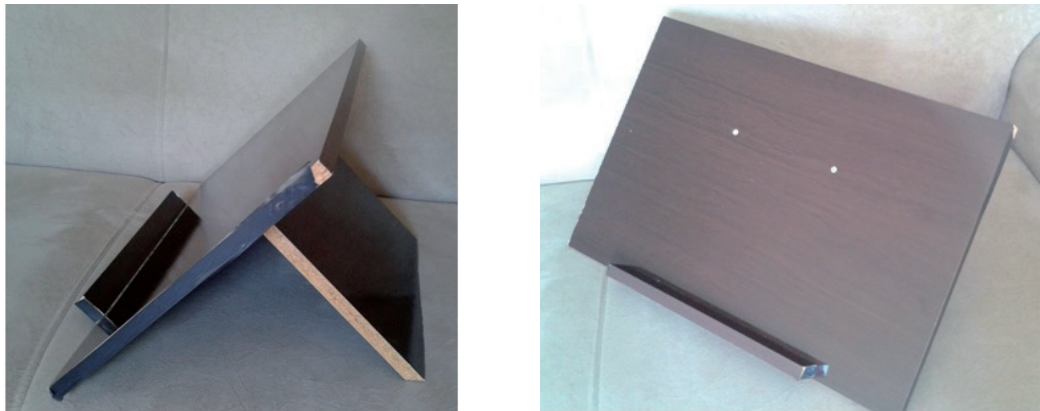


**Figure 2** - Tablet pen adapted to the specific conditions of the study participant prepared by the main researcher for the experimental condition B

Source: Research images.

The criterion of this experimental phase required the participant to reach 70% of independence to carry out the activities taught. When this criterion was reached, the next experimental phase started.

BC experimental phase: For the second intervention phase, the adapted orthosis was maintained (B) and the inclined plane made of wood (C) was inserted (Figure 3). The insertion of this resource was intended to increase the autonomy of using the tablet and to promote more stability of the device so that the participant had firmness in using it and could do it independently of third parties.



**Figure 3.** Images of the inclined plane adapted to the specific conditions of the participant of the study and elaborated by the main researcher for the experimental condition BC  
Source: Research images.

Experimental Phase BCD1: After the sessions with the assistive technology resources implemented in phases B and BC, sessions with automatic unlocking were performed once again in order to verify its usability with the participant of the research for complete independence. As in the other sessions, the inclined plane was used on the living room table, S.'s wheelchair was positioned in front of the inclined plane, the adapted pen was placed on her finger and the automatic lock was removed from the tablet. Subsequently, the tablet was placed on the inclined plane and the participant was asked to use the device. When reaching an autonomy of more than 90%, the next phase started.

Experimental Phase A2: The reversal session was based on the withdrawal of all adaptations and use of the tablet without the assistive technology features and configurations previously offered to the participant. Thus, with the abrupt reduction of S.'s independence when using the technological device for communication, the greater the validity of the intervention and of the resources built would be guaranteed, proving its effectiveness. With the same procedures of Experimental Phase A, the participant was asked to use the device without the technology resources during three consecutive sessions being offered.

Experimental Phase BCD2: After the reversal sessions (Experimental Phase A2), three sessions were performed with all assistive technology implemented (adapted pen, inclined plane and automatic unlock) to verify its usability with the research participant with complete independence.

## 2.9 INTEROBSERVATOR CONCORDANCE

The interobservers agreement of this study was performed through the reliability tests in 25% of the observations of each experimental phase, in which agreement over 75% between the records of the main researcher and the research assistant was obtained.



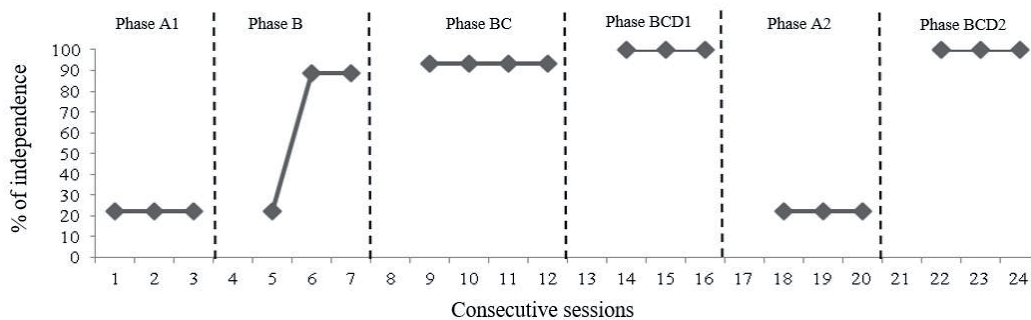
## 2.10 DATA ANALYSIS PROCEDURE

Considering that it is an intervention that can produce a behavioral change, the comparison design between interventions with reversion, with the following experimental phases was used: A1, B, BC, BCD1, A2, BCD2 (Gast & Leadford, 2014). Through the proposed design, information was systematized on each step of the process of implementation of a technology resource, being able to demonstrate the effects of each decision of the occupational therapist from the behavioral responses issued by the participant of the study.

The results obtained through the intervention carried out in this research came from the observation and analysis of the filming performed at the participant's residence and from the notes registered in the field journals and protocols specially constructed for the research.

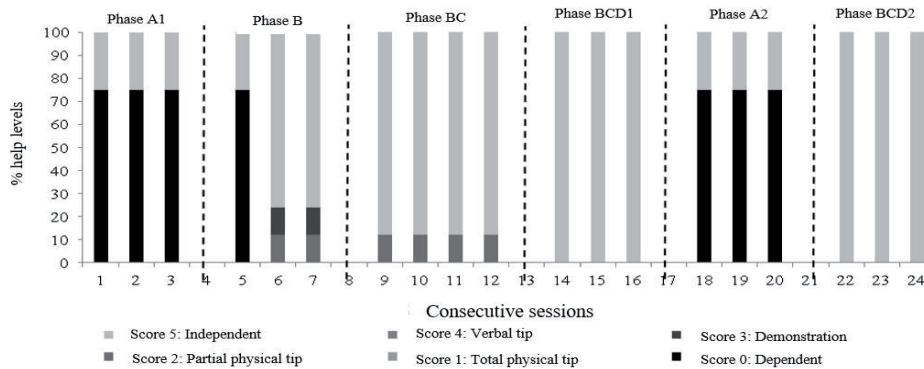
## 3 RESULTS

Figure 4 shows the percentage of the participant's independence in using the *tablet* from the insertion and withdrawal of assistive technology resources. Whereas Figure 5 shows the percentage of levels of help that the main researcher offered to the participant in each session prior to the intervention and during the implementation of assistive technology resources. It is important to note that, in the experimental phases A1 and A2, no aid levels were offered, but the absence of conduct or complete independence for its accomplishment was observed.



**Figure 4.** Percentage of participant independence to perform the requested activities during the experimental phases of the study

Source: Elaborated by the authors.



**Figure 5.** Percentage of the levels of help offered by the researcher to the participant to carry out the activities requested during the experimental phases of the study  
Source: Elaborated by the authors.

When analyzing the data presented in Figures 4 and 5, we could verify the fact that the participant had the deformity in her 2nd finger prevented her from performing the proposed activities in experimental phase A1, showing a dependence of 78%. From the second session of experimental phase B, with the insertion of the first assistive technology device to facilitate access, the participant obtained 89% of the total independence in the proposed activities that include the use of the tablet for communication. However, for the participant to achieve 100% independence, there were two items on the list of recorded protocol behaviors that needed to be thought out. The activities ‘Unlock tablet’ and ‘Select desired icon with the hand, fingers, using orthosis or tablet pen’ scored help levels 2 and 3, consecutively, indicating external help offered to the adolescent, corresponding to 20% help provided by the researcher.

Experimental Phase BC was comprised of the inclined plane added to the pen used in the previous phase. After this new feature was added to the intervention, the participant was able to communicate without needing another person to hold the tablet, favoring her autonomy and independence and providing a correct posture when using the tablet, allowing her to use it for a longer period of time.

Regarding score 3 of the activity ‘Select desired icon with hand, fingers, using orthosis or tablet pen’, the participant needed demonstration to perform it. This aid resulted in 10% of the researcher’s help to carry out the activity, as shown in Figures 4 and 5 during the experimental phase BC. Throughout the teaching sessions of the software operation and demonstrations of use offered to the participant, she was able to understand the functions and use them without demonstrations in other sessions, indicating the need to adapt to the software, its interface and operation, because only access to the screen was not sufficient to establish the maximum independence score.

With this result, we can see that for the participant to achieve 100% independence in using the tablet and software, she needed help to unlock the device independently. As an option, the participant and her family were offered with the possibility of removing the screen

lock, starting the device as soon as the protective cover was removed. Both agreed to do a test and check the effectiveness of this intervention.

After the screen lock option was removed (experimental phase BCD1 - orthosis and pen adaptation + inclined wooden plane + removal of screen lock), the participant went from score '2 - Partial Physical Tip' to '5 - Independent', facilitating its use and favoring her independence.

However, to validate the results, it was necessary to perform the experimental Phase A2 named 'reversion'. In the reversion, all of the assistive technology and access equipment used were withdrawn and the participant's performance was observed in the absence of the technologies. The reversion sessions scored 22% of independence in the proposed activities, a score similar to that achieved in the experimental phase A1. This result means that assistive technology and access capabilities were essential for the participant's independent use of the tablet and Vox4All software.

After the reversal, another step now called 'BCD2 experimental phase' was initiated, in which once more all the devices of assistive technology and access to favor the use of the tablet by the participant were made available (splint and adapted pen for tablet, inclined plane and unlock). When we included all these materials again, we found that the results returned to 100% independence (Figures 4 and 5).

Regarding the social validity of the study, the records of the events and dialogues with the participant and their parents indicated that they all evaluated the research as very productive, facilitating the communication of the adolescent with her relatives. In addition, it expanded the possibilities of S. using the different technologies implemented to increase her autonomy and potentialize effective communication in different environments, such as school and community.

### 3 DISCUSSION

The intervention described in the research aimed to propose training for the beginning of the use of an alternative mobile communication application namely the use of the tablet for an adolescent with cerebral palsy who uses an alternative communication board and also to investigate the specific demands and steps for this process. As described in the method and results, a total of 19 sessions were performed throughout the study, of which 10 were intervention, indicating that the introduction of the tablet occurred in a short period of time. We understand that the applied design was decisive for this issue, considering that in each session it was possible to measure the level of independence achieved by the adolescent and to program the guidelines and resources needed for the next meeting, with a view to increase autonomy in the use of the tablet.

The rationale for the choice of assistive technology resources followed the steps suggested by Manzini and Santos (2002), mainly to generate ideas and seek examples in the literature in order to favor access to the participant in using the tablet. When observing the results obtained in this research, we could see the progress of the participant in relation to the use of the tablet with the resources of assistive technology for alternative communication. In

the experimental phases, there is the minimum score on the chart at its beginning, and after we started the intervention, we could perceive an increase in her autonomy for using the tablet and also her communication with other people, besides being able to externalize her needs.

Thus, according to the results achieved in this research, we can validate the need for the insertion of assistive technology resources for access to the systems that enable alternative communication, considering that there was a need to implement the resources to favor the activation of the touch screen and its positioning (Pelosi, 2009; Cook & Polgar, 2015), especially in cases where the presence of motor impairments that make handling materials and equipment safely impossible, as is the case with cerebral palsy. Specifically regarding the orthosis, the motor characteristics related to the wrist and fingers of the participant were indicative of the proposition of an orthosis, which also assists in the stabilization and alignment of the wrist. However, for S. and her family, the choice for the research was that the target function of the orthosis should be the activation of the tablet.

The orthosis proposed in the intervention described in this paper was exclusively aimed to support the finger and the use of the pen for selection on the screen, without predicting the position of the wrist, and the participant was referred to the service of the municipality for the other intervention. On the inclined plane, its proposition helped to provide support for the tablet to favor the manual reach of the participant in the selection of items (Manzini & Deliberato, 2006). Also, combined with the resources made available, the possibility of new configurations of the device and the guidelines on the use of the application favored the autonomous use of the tablet and application by the participant, increasing her independence during interactions with the researcher.

The use of the communication board by the participant was always carried out with the help of the interlocutor, who positioned the resource so that the adolescent could point to the selected words with her finger. In addition, the interlocutor turned the pages as requested by the adolescent, and the application allowed the configuration of the boards in a dynamic system, giving more autonomy to the participant in the construction and issue of phrases which is one of the advantages presented by the literature in the use of mobile devices for alternative communication (Light & McNaughton, 2013; Cook & Polgar, 2015; Batorowicz, 2017).

It should be noted that the young participant was already using an alternative communication system previously implemented by professionals from speech therapy and occupational therapy who accompanied her over the years and that the intention of the research was to provide training for the transition from the paper board to the tablet. Thus, the teaching program described was not intended to propose and evaluate the introduction to an alternative communication system per se, but rather to favor its extension to other types of resources and strategies. In this sense, the specificity of the board used in the tablet to emit the sounds and voices selected by the participant acts as an important differential in this offer of new features and new possibilities, allowing the communication tool the opportunity to hear her say something, not just observe her pointing to the words on paper, besides making it possible for the adolescent to be heard by more people who are close. We can therefore say that technology acted as an ally to the process of alternative communication established with the

adolescent, in the sense of composing her strategies in order to confer greater communicative quality (Batorowicz, 2017; McNaughton & Light, 2013).

This point is especially important to the concern of researchers in the field, in that, despite the promising advancement of the increasing offer of technological devices, the focus of the interventions must remain with actions on how to feasibly extend communication for the users and on the availability of the interlocutors without the primary target being the use of the technological resource (Baxter et al., 2012; Nunes & Walter, 2014; Light & McNaughton, 2013). Implications of this nature directly affect the services and professionals working with the population of children and young people with disabilities and complex communication needs when trying to keep the available alternatives up to date and remaining attentive to the practices that really favor the expansion of communicative competence.

#### 4 CONCLUSIONS

The data provide indications about the applicability of the tablet associated with software for alternative and expanded communication as a resource to compose the strategies used by children with non-verbal cerebral palsy for communication. From the results and the discussions, it is possible to conclude that the use of the tablet for the communication of the participant showed to be viable and of rapid implementation considering the number of sessions necessary for the intervention, favoring her independence in manipulating it and initiating dialogues with the researcher. However, due to the characteristics of the young participant and the way the tablet was activated, assistive technology resources were essential to guarantee its use.

With the description of each procedure carried out, there was a systematization of the strategies employed in each of the cases regarding the teaching of the use of a new resource for alternative communication. Observing and analyzing the strategies used and the behavior of the adolescent in relation to the use of the tablet allowed the real need of the assistive technology resources to be understood, as well as the tablet being an option to the alternative communication paperboard already used by the adolescent.

Following on from this, it is considered that the data collection and analysis procedures along with the use of experimental designs allowed for decision making and adjustments in the instructions and resources provided during the intervention according to the participant's own response, which can also serve other occupational therapists or professionals who may intervene in this area.

Finally, it must be pointed out that it is necessary to continue studies that focus on the use of tablets and applications for alternative communication by children and young people with cerebral palsy at the national level, and to expand the scope of investigations about its implementation in multiple life contexts of its users.

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Received on: 12/18/2017

Reformulated on: 03/08/2018

Accepted on: 03/12/2018

