

TRAINING PROGRAM FOR THE USE OF ALTERNATIVE WRITING: CASE STUDY WITH A YOUNGER WITH CEREBRAL PALSY

PROGRAMA DE TREINAMENTO PARA O USO DA ESCRITA ALTERNATIVA: ESTUDO DE CASO COM UM JOVEM COM PARALISIA CEREBRAL

PROGRAMA DE CAPACITACIÓN PARA EL USO DE ESCRITURA ALTERNATIVA: ESTUDIO DE CASO CON UN MENOR CON PARÁLICA CEREBRAL

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ABSTRACT: One of the attributions of the special education teacher is the implementation and teaching of Assistive Technology resources, therefore, this research aimed to develop and evaluate an intervention program for a young people with Cerebral Palsy that would enable them to make use of an Assistive Technology resource for alternative writing. A quasi-experimental study of a single subject type AB was carried out, the study considered as a Dependent Variable (DV) the performance of an 18 year old, boy with Cerebral Palsy, in using computational resources for alternative writing and the Independent Variable (IV) was an intervention program that involved the teaching of 13 skills that advanced in the degree of difficulty. To measure the participant's learning, four types of assistance: verbal guidance, Demonstration, Gesture Tip and Physical Guidance. During data collection, objects and resources were used for conventional and alternative writing; participant characterization questionnaire; descriptive registration and event registration protocol; and footage of the meetings. The results were positive regarding the procedures for the application of the program carried out by the teacher and that the teaching was effective in achieving autonomy on the part of the participant for alternative writing on the computer.

KEYWORDS: Assistive technology. Alternative writing feature. Computer access. Cerebral palsy. Special education.

RESUMO: Uma das atribuições do professor de educação especial é a implementação e ensino de recursos de Tecnologia Assistiva, portanto, esta pesquisa teve como objetivo desenvolver e avaliar um programa de intervenção para um jovem com Paralisia Cerebral que o possibilitasse fazer uso de um recurso de Tecnologia Assistiva para escrita alternativa. Realizou-se um estudo quase experimental de sujeito único do tipo AB; o estudo considerou como Variável Dependente o desempenho de um rapaz de 18 anos com Paralisia Cerebral em utilizar recursos computacionais para a escrita alternativa, e a Variável Independente (VI) foi

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um programa de intervenção que envolveu o ensino de 13 habilidades que avançavam no grau de dificuldade. Para aferir a aprendizagem do participante utilizou-se quatro tipos de auxílio: Orientação Verbal, Demonstração, Dica Gestual e Ajuda Física. Durante a coleta de dados foram utilizados objetos e recursos para escrita convencional e alternativa; questionário de caracterização do participante; protocolo de registro descritivo e de registro de evento; e filmagens dos encontros. Os resultados mostraram-se positivos quanto aos procedimentos de aplicação do programa realizado pela professora e o ensino foi eficaz para o alcance da autonomia por parte do participante para escrita alternativa no computador.

PALAVRAS-CHAVE: *Tecnologia assistiva. Recurso de escrita alternativa. Acesso ao computador. Paralisia cerebral. Educação especial.*

RESUMEN: *Una de las atribuciones del docente de educación especial es la implementación y enseñanza de los recursos de Tecnología Asistencial, por lo que esta investigación tuvo como objetivo desarrollar y evaluar un programa de intervención para un joven con Parálisis Cerebral que le permitiera hacer uso de un recurso de Tecnología Asistencial para escritura alternativa. Se realizó un estudio cuasiexperimental del tipo de sujeto único tipo AB, el estudio consideró como Variable Dependiente el desempeño de un niño de 18 años con Parálisis Cerebral, en el uso de recursos computacionales para escritura alternativa y la Variable Independiente (VI) fue un programa de intervención que implicó la enseñanza de 13 habilidades que avanzaban en el grado de dificultad. Para medir el aprendizaje del participante se utilizaron cuatro tipos de asistencia: Orientación Verbal, Demonstración, Sugerencia gestual y ayuda física. Durante la recopilación de datos, se utilizaron objetos y recursos para la escritura convencional y alternativa; cuestionario de caracterización de participantes; protocolo descriptivo de registro y registro de eventos; y metraje de las reuniones. Los resultados fueron positivos en cuanto a los procedimientos de aplicación del programa realizados por el docente y que la enseñanza fue efectiva en lograr la autonomía del participante para la escritura alternativa en la computadora.*

PALABRAS CLAVE: *Tecnología de asistencia. Función de escritura alternativa. Acceso informático. Parálisis cerebral. Educación especial.*

Introduction

Public policies in favor of school inclusion have been implemented through a continuous and gradual process guided by some legal prerogatives, among them the National Guidelines for Special Education in Basic Education (BRAZIL, 2001), the National Policy on Special Education from the Perspective of Inclusive Education – PNEEPEI/2008 (BRAZIL, 2008), Resolution no. 4 CNE/CEB (BRAZIL, 2009), Law no. 13,146 (BRASIL, 2015), entitled Brazilian Law for the Inclusion of People with Disabilities and others. In order to talk about school inclusion, it is necessary to offer conditions of access, permanence and participation to all students.

Among the public to be served by special education, as a teaching modality, are the students provided for by Decree No. 7.611/2011 referred to as Special Education Target Audience (SETA) students. Among the types of disabilities that make up the group of SETA students, this article presents the report of a research developed with a student with Physical Disability (PD), more specifically with Cerebral Palsy (CP).

Students with CP are offered Specialized Educational Assistance (SEA), defined as a set of resources and services organized based on their individual educational needs through the work of the Special Education teacher. Among the functions of SEA is “to identify, develop and organize pedagogical and accessibility resources that eliminate barriers to the full participation of students, considering their specific needs” (BRAZIL, 2008, p. 10), among these strategies are actions with Assistive Technology (AT) devices.

As it is an area of knowledge that enables physical, communicational and/or pedagogical accessibility, Assistive Technology (AT) is a service of multiprofessional responsibility, and professionals in the field of Occupational Therapy, Speech Therapy, Physiotherapy and Special Education teachers can offer this service, among others that address questions about the rights of people with disabilities and/or reduced mobility.

On the use of AT by special education teachers, Nordström et al. (2018) and Svensson et al. (2021) carried out studies that aim to demonstrate how AT applications could assist in the reading and writing process for SETA students. They worked with 54 special education teachers and 59 SETA students with severe reading difficulties. The results showed that the use of AT applications motivated and gave autonomy to students to carry out their activities and participate in regular education, showing themselves capable of using the resources. The studies raised the possibility of customizing the use of AT for this purpose and portray the challenges to mediate the implementation of these resources.

Fachinetti, Gonçalves and Lourenço (2017), in a research that aimed to implement and evaluate an AT resource for a student with CP in a collaborative way with the teacher of the Multifunctional Resource Room, reinforced the relevance of the role of the special education teacher in the implementation of these resources and the influence of teaching strategies adopted by the teacher to favor school inclusion and autonomy for students with CP.

Silva and Manzini (2013) reported the need for pedagogical planning for students with CP to take into account not only the isolated motor act, but also their motor skills, the context and the resources to be used by the student. Gutierrez de Queiroz and Bracciali (2017) also pointed out the need for an assessment that emphasizes the individual, in particular, the functionality of the person and something (service or resource) for them; for the authors, the

choice of AT resource should be based on the individual's abilities. Silva and Yamaguti (2020) carried out a systematic review that involved eight studies, and pointed out as results the benefits of using AT in improving accessibility to teaching and learning and in promoting the autonomy and independence of students who use it, however, showed disarticulation of these activities to the common curriculum of the students.

There is a consensus in the literature on the benefits of Assistive Technology, however implementing them and providing conditions for their effective functioning are not simple tasks, they do not only require the use of a resource, but rather a thorough evaluation of the student and their demands in different contexts and the from this, reflect and plan on: Which resource to use, how to elaborate/adapt and what is the best teaching strategy for its use by the PAEE student, prioritizing the functionality of the use of the resource (ROCHA; DELIBERATO, 2012).

Petroni, Boueri and Lourenço (2018) developed a study that aimed to evaluate the transition process from the paper communication board to the tablet communication board for a young woman with CP. The study was developed with an 18-year-old girl with CP and non-articulated speech communication. A descriptive record protocol and an event record protocol were used as instruments for data collection. The outcomes showed positive data, given that the intervention was viable and positive, in addition to presenting contributions regarding the step by step developed by the researchers.

As for AT associated with computer use, studies have shown potential benefits and suggestions for use. Man and Wong (2007) conducted a case study with two students with CP without spoken speech to assess their performance in computer use; the results showed that the higher the user satisfaction level, the better his response time when using the resource. Koester, Simpson and Mankowski (2013) carried out a study to describe the effectiveness and usability of two software as helping users with physical disabilities to adjust keyboard and mouse settings according to their own needs.

Bracciali *et al.* (2016) developed a survey with 37 participants that aimed to identify the profile of Brazilian children and young people with CP who are computer users. The results show the benefit of the resource, but they pointed out that most of those investigated do not have access to the resource and are unaware of the accessibility options that exist in it.

Teixeira, Gonçalves and Aiello (2020) carried out an intervention to teach an adult with CP to use an input device to access the computer; participant performance was measured by the design of multiple surveys. The outcomes showed the feasibility of interventions of this type to

be applied by special education teachers and the relevance of considering the interests of the participant in the elaboration of activities.

From these studies and the possibilities of AT pointed out in the literature, the research in question had the general objective of developing and evaluating an intervention program for a young person with Cerebral Palsy that would enable him to make use of an Assistive Technology resource for alternative writing. Specific objectives were listed: a) to identify the student's writing ability and skills regarding the use of alternative writing resources; b) choose, plan and develop/adapt resources for alternative writing; c) run an intervention program to teach the student to use AT resources; d) evaluate the effectiveness of the intervention program by measuring the student's autonomy in using the computer as a resource for alternative writing.

Method

A quasi-experimental study of a single individual of type AB was carried out, where the actions of the participant were constantly measured, seeking to compare their development and the before and after the intervention performed by the researcher (COSBY, 2003; SAMPAIO et al., 2008). Thus, the dependent variable (DV) was established regarding the participant's performance in using computational resources for alternative writing and the independent variable (IV) was the intervention program proposed by the researcher, a professor in the area of special education.

The research was approved by the Ethics Committee in Research with Human Beings of the Federal University of São Carlos (CAAE: 39385520.0.0000.5504) and all the Terms were signed by the participants. Data collection was carried out at the participant's home³, an 18-year-old male with Cerebral Palsy, with spastic quadriplegia, without articulated speech and a wheelchair user.

Materials and Equipment

Objects and resources were used for conventional and alternative writing, such as: pencil, pen, two thickeners, writing facilitator, three types of keyboards, wooden board, printed

³ Data collection took place at a peculiar historical moment that devastated the whole world to the detriment of the emergence of a new virus called SARS-COV-2, popularly known as Covid-19. As a result, safety protocols were respected and physical contact was avoided during all sessions, in addition to using Personal Protective Equipment (PPE) by both the researcher and the participant.

questionnaire, printed alphabet, laptop and netbook, optical mouse, notebook mouse, a cell phone and a video camera to record the sessions.

Instruments

Participant characterization questionnaire – It contained 15 questions, six objective and nine subjective, about personal issues and matters of interest, which was applied with the participant and his mother.

Event registration protocol – Form with the description of the 13 actions and skills to be applied to each session, informing whether the participant performed the proposed action independently or not, how he did it and what possible adaptations or insertions of resources were necessary.

Description registration protocol – Description of the date of the meeting, resource presented, the skill taught, whether the resource was accessible (yes or no? Why?) and suggestions for improvement for the resource and devices offered.

Procedures

Data collection took place in 14 sessions which lasted on average 45 minutes distributed in an interval of 43 non-consecutive days between December 20, 2020 and March 10, 2021, with two days for the pre-intervention phase A, eleven meetings for intervention and a meeting to apply the follow-up as phase B, with an interval of 40 days after the end of the intervention.

A questionnaire and two protocols were elaborated, in addition to producing eight activities in the doc model. based on the youngster's preferences, identified by the characterization questionnaire. In general, the activities consisted of reading and typing words and phrases with and without the use of punctuation and graphic accentuation, questions that involved scanning and highlighting words with different colors, activating the Microsoft Word software reader and the process of saving the activities which had been performed.

For phase A, the application of a questionnaire for characterization and observation of the participant was carried out with the registration in the descriptive and event protocols. Table 1 presents the main findings.

Table 1 – Characterization of Phase A

Identified skills	Absence of identified skill
1- Moves the right hand, with limited strength. 2- Recognition, writing and typing of the full name (with change of letters). 3- Color differentiation. 4- Recognition and writing of dictated letters, with changes in the letters M-N, K-J, Ç-C. 5- Use the weight of the upper limb to hold the paper. 6- Moves the laptop mouse with the index finger, without hand-eye coordination. 7- Identifies the backspace key and function. 8- Identifies the numbers on the keyboard. 9- Type the full name, but does not identify capital letters 10- Identifies and points with the right index finger the places where he should write. 11- Memorizes the previously offered directions. 12- Memorizes keys and images, such as the button that turns on the notebook and the password.	1- Difficulty in activating the optical mouse cursor and using the scroll bar. 2- Difficulty in selecting the desired letter using the mouse click. 3- Does not know the steps to turn on the device. 4- No manual control to click and select folder using external mice. 5- Does not know the shortcut to undo action. 6- Difficulty directing the cursor to the beginning of the line and selecting to start writing. 7- Impossibility of using two keyboard keys simultaneously. 8- Unaware of commands in text editor software. 9- Difficulty handling laptop mouse and cursor direction.

Source: Prepared by the authors

After analyzing the participant's performance and the difficulties presented by him, it was decided to carry out an intervention program (VI) that sought to teach thirteen actions so that the young person could learn to use the computer more autonomously, with each action required the teaching of various skills organized in a continuum of sub-phases to the participant, described below (Chart 2):

Table 2 – Description of the subphases of the intervention program for teaching each action

Action	Description of the steps taken in the teaching program
1) Turn on the laptop	Direct the gaze to the keyboard – identify the key with the power symbol – select this key on the notebook keyboard – wait a few seconds – type the password with the index finger of the right hand – redirect the gaze to the screen for conference – select the key "enter" if the password was right or the "backspace" key to correct the error and start over.
2) Identify / point	Listen to the researcher's command – look at the laptop screen – identify what was requested – point to the desired location using the index finger of the right hand.
3) Trigger the cursor	Look on the screen and identify the requested location – identify on the screen where the cursor is – look at the numeric keypad and identify which number to press – choose, press and hold a number between “2/4/6/8” to move the cursor – look at the cursor movement on the screen – release the key when reaching the desired location – look again at the keyboard – click on the number “5” referring to the key to activate the cursor.
4) Choose folder/activity	Listening to the researcher’s command – look at the laptop screen – identify and point to the requested icon – look at the keyboard – move the cursor to the desired icon – look at the screen for conference – look at the keyboard again – click the cursor to open the desired location by double-clicking quickly on the number “5” – look at the screen and wait for the laptop's response time.
5) Select (item/where to write)	Look at the screen and choose the activity – identify and point on the screen where to start writing – still on the screen identify where the cursor was located – look at the keyboard and press the key to move the cursor to the desired location – look at the screen for checking – return your gaze to the keyboard and press the “5” key.

6) Type (words/numbers)	Look on the screen and/or on the paper the spelling of the word to be written – select where to write – look at the keyboard – type each letter of the word using the index finger of the right hand – look at the screen for checking – look at the keyboard and select the “space” key, if the word was right or the “backspace” key to correct the mistake and start over.
7) Use Word commands	Look at the screen and choose the activity – select where to write – look at the keyboard – activate the “CapsLock” key – type the desired letter – look at the screen for conference – deactivate the “CapsLock” key – look at the screen and identify the cursor – move the cursor to the virtual keyboard icon on the bottom bar of the screen – activate the virtual keyboard by double-clicking quickly on the number “5” – move the cursor again to the writing location and activate commands such as: ()/” /?/^/! (according to the researcher’s command) by selecting the number “5” – look at the screen for conference – look at the keyboard – move the cursor to the (-) key on the top bar of the virtual keyboard to minimize it – select the key with the mouse on the keyboard – look at the screen for conference – move the cursor to the writing location – select the location and resume typing.
8) Highlight words	Look at the screen and choose the activity – look for the cursor on the screen – position the cursor at the beginning of the word to be highlighted – look at the keyboard and click with the index finger on the “F8” key and then on the side arrow of the keyboard – look to the screen to know how far to select by tapping the right arrow – release the arrow at the end of the word.
9) Coloring words	All the steps needed to highlight a word – look at the keyboard – move the cursor using the numeric mouse to the top bar of word where the “text highlight color” icon appears – click the arrow on the side of the icon – move the cursor to the desired color – click on the mouse number 5 to select the color – look at the screen to follow the process.
10) Activate/deactivate word reader	All steps needed to highlight word – move cursor to “Review” box on top bar – look at keyboard – select review box with mouse click number 5 on keyboard – look at screen – move cursor inside the “Review” box to the read aloud icon (A”) in the upper left corner – select the icon by clicking the number 5 on the keyboard mouse (opens a control box with option of power/pause/pass/ return) – move the cursor to the control box located in the left corner of the word document – activate/pause reading by clicking on l>/ll inside the control box to start and end reading by the software.
11) Save activity	Look at the screen and locate the cursor – look at the keyboard and move the cursor through the numeric keypad to the left corner of the upper bar where the icon with the image of a floppy disk appears – look at the conference screen – select the icon by clicking on the number 5 (enter).
12) Close page/folder	Look at the screen and locate the cursor – look at the keyboard and move the cursor through the numeric keypad to the right corner of the upper bar where the icon with the letter X appears – look at the conference screen – select the icon by clicking on the number 5 (enter).
13) Turn off the laptop	Look at the screen and locate the cursor – look at the keyboard and move the cursor through the numeric keypad to the lower right corner of the screen – find the icon with the Windows symbol – look at the conference screen – select the icon by clicking on the number 5 (enter) – look at the keyboard – move the cursor to the on/off symbol – recognize and select the icon by clicking on the number 5 – move the cursor again and choose the “off” option – select the icon by clicking on the 5 (enter).

Source: Prepared by the authors

In addition to teaching the skills presented, gradual changes were made during the intervention in the aspects presented below.

Table 3 – Changes proposed in the meetings

Postural adjustments	Insertion and adequacy of AT features and accessibility options
<ul style="list-style-type: none"> Adjustments to the participant's posture in relation to the plastic chair and table available 	<ul style="list-style-type: none"> Replacement of the external physical keyboard with a smaller size keyboard,

<ul style="list-style-type: none"> • Adaptations in the height of the laptop screen (5 books were placed that allowed the laptop to be at a height of approximately 15 cm above the table) <ul style="list-style-type: none"> • Adaptation of the young person's posture by placing a pillow on the back to bring him closer to the keyboard. • Change in the participant's work table, so that the height was suitable, and he started to participate in the meetings in his wheelchair. • Adjustment of the wheelchair's position to improve the participant's posture and positioning at the table. • Positioning of the upper left limb, as it was placed on the keyboard and unintentionally pressed keys, which impaired the netbook's functioning. 	<p>which would adapt to the size of the table that the participant had available.</p> <ul style="list-style-type: none"> • Fixing the physical keyboard on the table, with adhesive tape. • Insertion of the mouse pad. • Insertion of the wireless optical mouse. • Change in cursor view from I to arrow and zoom in arrow size. • Reutilization of the full-size physical keyboard, since the large keyboard had light indicators for activating the numeric keypad and Caps Lock. • Reduced cursor movement speed. • Insertion of a new laptop computer, as the previous one was constantly crashing. • Adaptations in the settings of the type and speed of speech used by the Word reader.
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Source: Prepared by the authors

In the meetings, assistance was offered to the participant for the execution of each proposed action, in levels of greater (physical help) and lesser intensity (verbal guidance), as described in Chart 4. It is noteworthy that the intention of the program was to minimize the intensity of the assistance and increased achievement independently by the participant throughout the sessions.

Table 4 – Description of what each level of aid consisted of

Verbal Guidance (VG)	An explanation or oral reminder was offered on how the participant could perform the action.
Demonstration (D)	The appropriate way to execute the command or movement necessary to perform the action was demonstrated without touching the laptop (the researcher performed the gesticulation of the movement for the participant to visualize).
Gestural Tip (GT)	It was pointed directly at the laptop (on the screen or keyboard) something punctual that needed to be triggered by the participant to perform the action, for example, to show a specific key.
Physical Help (PH)	It consisted of performing the action/movement by the researcher, and for scoring this, the times that the movement was performed for the first time to teach the skill were disregarded, being scored only when, even after the skill had already been taught to the participant, the levels of previous aids were not enough and he demanded to visualize the action again to be able to execute it.

Source: Prepared by the authors

At the end of the intervention program, phase B was carried out, with an interval of 40 days, in order to verify the maintenance of the participant's performance in the actions taught during the intervention.

For data collection and analysis, based on the event recording protocol, all sessions were recorded and scored according to the number of opportunities offered to the participant to

perform the actions taught and the frequency and intensity of the level of assistance requested, as well as the frequency of performance with full independence by the participant. Therefore, the participant's performance can be measured throughout the sessions, including to adjust the intervention program to the demands presented.

The effectiveness of the intervention considered the increase in the participant's autonomy in the use of the computer for alternative writing and the reduction of the levels of help demanded by the participant throughout the intervention for the development of actions, even with the increase in complexity in the subphases.

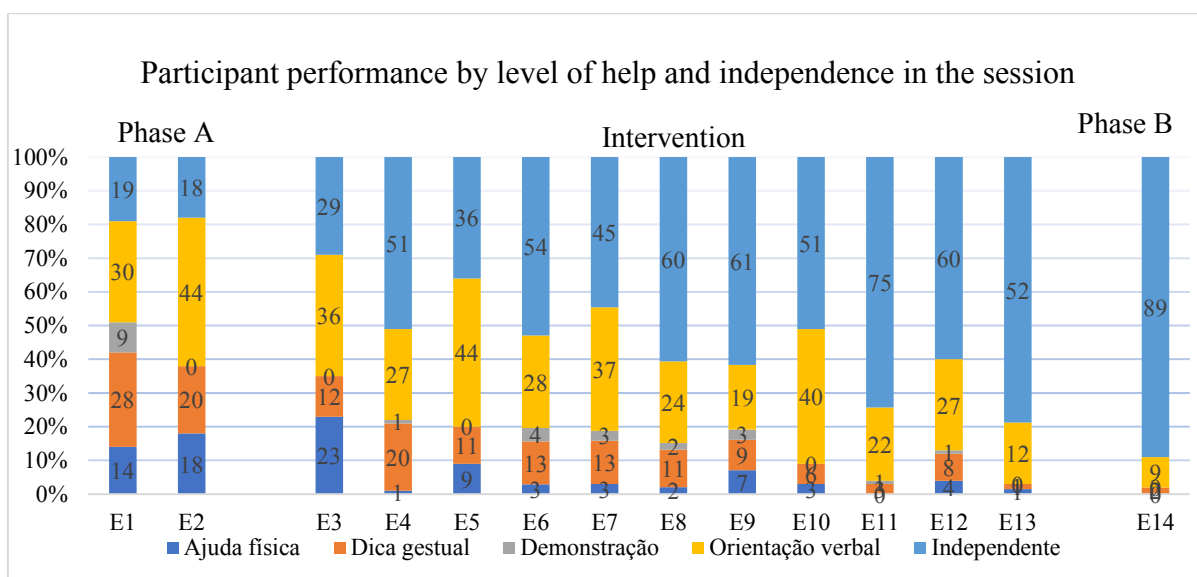
Intra-observer agrément

The videos and the event recording protocol were submitted to the two researchers in the area of Special Education, with initial training in occupational therapy and speech therapy, to check the scores assigned to the sessions. These judges blindly and independently selected the videos for analysis and scored them according to the instrument. An agreement greater than 70% was obtained between the researcher's and the evaluators' counts, indicating a good index for the reliability of the data.

Results

The results were shown in Graph 1, where the data are highlighted according to the amount of opportunities offered to the participant per session during Phase A, the intervention, and Phase B, indicating how he becomes increasingly independent in perform access and write actions on the computer throughout the process.

Graph 1 – Participant performance by level of help and independence in the session



Ajuda física = Physical help; Dica gestual = Gestural tip; Demonstração=Demonstration; Orientação Verbal = Verbal Guidance; Independente = Independent

Considering that the levels of help ranged from the most intensive (physical help) to the least intensive (VG), it can be observed that the most offered help was the simplest type, verbal guidance, followed by gestural cues; it is noteworthy that the greater demand for gestural cues and physical help presented by the participant was due to the impossibility of highlighting words with the conventional mouse and of typing two keys simultaneously to perform the graphic accentuation of them. These factors resulted in a higher frequency of physical help to perform activities in Phase A.

The graph also indicates peaks of help in the E5, E6, E10 and E12 encounters. Such increases are associated with the insertion of new resources and consequent increase in the challenge of using them by the participant, being in (E5 - insertion of the virtual keyboard, E6 - insertion of the mouse on the keyboard, E10 - increase in the level of difficulty of the activity " selection-highlight-coloring and word color change", E12 – insertion of the use of the shortcut for the word reader). Even with the intensification in the volume of help levels, these were more frequent in the verbal guidance format.

From the data analysis, it is pointed out that the intervention program (VI) carried out in this research was successful. When observing the performance of the participant in the two meetings of Phase A, before the application of the VI, the levels of autonomy regarding the use of the computer for alternative writing are shown to be minimal; these levels gradually rise and even in the three meetings where there is a decline in this independence (E5, E7, E10), caused

by the demand for acquiring new and more complex skills, autonomy showed higher rates than the period corresponding to Phase A.

The increase in VD intensified in the last three meetings and the skills acquired during the VI remained high after a period of 40 days, since in the meeting for Phase B, the participant performed most of the proposed actions independently and few sometimes he demanded help, which allows us to say that he learned the necessary skills to perform the actions that were taught to him during the intervention.

Discussion

As it is a case study, this research guided the look at the detailed sharing of the methodological paths followed in the implementation of a short-term intervention program that did not demand the use of many resources.

The initial stage of the study consisted of getting to know the participant, understanding their demands and desires, as well as the skills presented by them. The importance of looking at the participant and hearing about their tastes was punctuated by Silva and Manzini (2013), Fachinetti, Gonçalves, Lourenço (2017) and by Teixeira, Gonçalves and Aiello (2020), who affirm the cruciality of knowing and recognizing the specificities of SETA students and to provide opportunities for their participation in decision-making. The challenge of communicating with a person with CP without articulated speech was highlighted by Man and Wong (2007) and Rocha and Deliberato (2012).

In line with the literature, the activities proposed in the program were designed considering the interests of the participant: these were identified through the application of the characterization questionnaire. Among the benefits of listening to the student, it is noted that “it is possible to establish criteria to develop resources with functional perspectives that meet the specific needs of students with disabilities” (ROCHA; DELIBERATO, 2012, p. 72)

The format of the activities and the arrangement of the questions were presented in a manner consistent with the participant's year of schooling, envisioning a possible future autonomy of the young person to carry out their activities in a remote teaching format. The approximation of the content worked in the activities that involve AT with the content seen by the student in the regular classroom is an issue that requires a more careful look on the part of the teachers, punctuate Silva and Yamaguti (2020); a possible way to solve this gap may be to carry out an activity planning work carried out in partnership between a regular class teacher

and a special education teacher and to use AT resources in the student's common class, for example, the computer.

The research participant did not have a computer or laptop at home, his contact with the equipment occurred sporadically at school, during face-to-face classes; when asking the mother about the possibility of acquiring the equipment for the young person, the high purchasing value of the item was the reason given by her for not purchasing it. The findings by Braccialli et al (2016) portray the large number of people with CP who could benefit from the use of the computer, but do not have it due to lack of knowledge of its accessibility functions and because they do not know the existing funding for the acquisition of these resources by the person with deficiency.

The advantages and possibilities of using the computer and its software for accessibility as AT resources that favor alternative writing are evidenced by (KOESTER; SIMPSON; MANKOWSKI, 2013; MAN; WONG, 2007; NORDSTRÖM *et al.*, 2019; SVENSSON *et al.*, 2019; SVENSSON *et al.*, 2021; TEIXEIRA; GONÇALVES; AIELO, 2020); these authors also highlighted the importance of monitoring the implementation process and making the necessary adjustments to meet user specifications. The researcher's watchful eye to reflect on the adjustments and adaptations in the participant's posture and in the resources necessary for the success of the intervention can be considered the differential in the process of implementing the alternative writing in this study.

The importance of analyzing the intervention program in a quantitative and qualitative way is inferred, as quantifiable data are not always able to convey the richness of the details demonstrated by the participant. The descriptive recording protocol was of great relevance to record the acquisition of secondary learning during the intervention, such as, for example, the participant's ability to identify spelling mistakes made by him/her while writing words and his/her autonomy to voluntarily make the correction. The benefits of AT in the acquisition and improvement of reading and writing for SETA students are also emphasized by Nordström *et al.* (2019), Silva and Yamaguti (2020) and Svensson *et al.* (2021).

The results of the study make it possible to reflect on possible paths for the practice of the special education teacher, with regard to the implementation and teaching of the use of Assistive Technology resources to promote alternative writing and enable the inclusion of these students in virtual learning environments.

Final considerations

The results showed that it is possible for the special education teacher to teach students with Cerebral Palsy several skills that allow them to develop alternative writing through the use of the computer, using few concrete AT resources.

Another relevant data that the study pointed out was the question of intervention time; demonstrated that carrying out an intensive program, more often in the short term, with a focus on computer use and access to teaching specific and effective skills can generate a more positive result than building a long plan, with several different objectives, and rotate these goals throughout the year, as is typically the case with practices in Multi-Function Resource Rooms.

Finally, the data showed the feasibility of application and the benefits of Assistive Technology, specifically of alternative writing in the practice of Special Education teachers; the step by step of each subsection for teaching the 13 skills makes it possible to replicate the study by new research and the dependent variable indices demonstrate its pertinence.

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