MENDIVE
REVISTA DE EDUCACIÓN

Translated from the original in Spanish

Technological tool to support skills training of skills in students with intellectual disabilities

Herramienta tecnológica para apoyar la formación de habilidades en alumnos con discapacidad intellectual

Ferramenta tecnológica de apoio à formação de habilidades para estudantes com deficiência intellectual

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ABSTRACT
Special education is due to the preparation of the child with intellectual disability for life, where the training of skills is a primary need. As a response to this problem, research is conducted, which aims to establish a technological tool to support the formation of skills in children with intellectual disabilities, which serve as support for the work of the teacher. In its development methods of the theoretical level were used, such as analytical-synthetic, induction-deduction; and from the empirical level, such as the documentary analysis, observation and interview, as well as those corresponding to descriptive and inferential statistics that allowed compiling, interpreting and processing the information related to the subject. As a result, a computer application is obtained, which contributes to the formation skills in students with intellectual disabilities, providing a range of functionalities that facilitate the development of activities related to the facilitated language, phonemic processes, recognition of objects in the daily life, the interaction with the family with corrective and / or compensatory character. It allows the interaction of the student with the computer application, always with the presence of the teacher using levels of help that provide success in the learning of skills, evaluating their performance.

Keywords: technological tool; intellectual disability; skills.

RESUMEN
La educación especial se debe a la preparación, para la vida, del niño con discapacidad intelectual, donde la formación de habilidades constituye una necesidad primordial. Como respuesta a esta problemática, se realiza la investigación, que tiene como objetivo fundamentar una herramienta tecnológica para apoyar la formación de habilidades en niños con discapacidad intelectual, que sirvan de sustento a la labor del profesor. En su desarrollo se utilizaron métodos del nivel teórico, como el analítico-sintético, inducción-deducción; del nivel empírico el análisis documental, la observación y la entrevista, además de los correspondientes a la estadística descriptiva e inferencial que permitieron recopilar, interpretar y procesar la

información relacionada con la temática. Como resultado se obtiene una aplicación informática que contribuye a la formación de habilidades en alumnos con discapacidad intelectual, proporcionando una gama de funcionalidades que facilita el desarrollo de actividades relacionadas con lenguaje facilitado, los procesos fonemáticos, reconocimiento de objetos en la vida cotidiana, la interacción con la familia con carácter correctivo y/o compensatorio. Permite la interacción del alumno con la aplicación informática, siempre con la presencia del profesor, utilizando niveles de ayuda que le proporcionen éxito en el aprendizaje de habilidades, evaluando su desempeño.

Palabras clave: herramienta tecnológica; discapacidad intelectual; habilidades.

RESUMO
A educação especial consiste em preparar a criança com uma deficiência intelectual para a vida, onde a formação de competências é uma necessidade primária. Em resposta a este problema, está a ser desenvolvida investigação com o objectivo de estabelecer uma ferramenta tecnológica de apoio à formação de competências em crianças com deficiência mental, que irá apoiar o trabalho do professor. No seu desenvolvimento, foram utilizados métodos a nível teórico, tais como analítico-sintético, indução-dedução; e a nível empírico, tais como análise documental, observação e entrevista, para além dos correspondentes a estatísticas descritivas e inferenciais que permitiram a recolha, interpretação e processamento da informação relacionada com o tema. Como resultado, obtém-se uma aplicação informática, que contribui para a formação de competências nos alunos com deficiência intelectual, proporcionando um conjunto de funcionalidades que facilitam o desenvolvimento de atividades relacionadas com linguagem facilitada, processos fonêmicos, reconhecimento de objectos na vida quotidiana, interação com a família com carácter correctivo e/ou compensatório. Permite a interacção do aluno com a aplicação informática, sempre com a presença do professor, utilizando níveis de assistência que proporcionam sucesso na aprendizagem, avaliando o seu desempenho.

Palavras-chave: Ferramenta tecnológica; deficiência intelectual; competências.

INTRODUCTION

The increase and expansion in the generation and use of information has contributed to accelerate, exponentially, the scientific, technological and social development of humanity; an incalculable wealth of knowledge has been accumulated over the years, reproduced in various supports for its conservation and transmission in time and space.

This emerging information society , driven by a dizzying scientific breakthrough in a neo-liberal-globalizing socio-economic framework and underpinned by the widespread use of powerful and versatile Information and Communication Technologies (ICTs), involves changes that reach all areas of human activity. Its effects are manifested in a very special way in work activities and in the educational world. (Marqués Graells, 2012)

The technological innovations that are taking place in society have made rethink how to teach. So the school is adapting to social progress and the interests and characteristics of children, in response to the needs of the educational community, trying to offer the same opportunities for all, reaching a teaching

a flexible model and of sufficient quality so that institutional education is recognized and demanded by society as a whole. (Heredero & Oliva Carralero, 2014) The speed with which science advances impels teachers and students, during the teaching- learning process, to the incessant search for knowledge to introduce it into social practice, in addition to sharing it. This requires the efficient use of ICT as an educational resource that favors their creativity and independence. (Prieto Díaz, et al., 2011)

Currently, the task of teachers must transcend the transmission of content. From the role of mediator of the initial and permanent learning of the students, it must support a process of construction of knowledge and information, both individual and collective, articulated in the intra and extra school spaces.

In this task, ICTs can be very useful and accessible tools, especially since its formative use, they allow, teachers and students, ways of classroom virtual communication and that stimulate learning. (Echeverría Sáenz, 2014)

Given the development achieved and the knowledge accumulated by humanity, it is essential that teachers direct their work, more to teach to learn than to transmit information. They must equip the student with a series of skills that allow them to face the specific requirements and tasks that they must fulfill. In this way, the emphasis should be on the student assimilating the necessary modes of action, to acquire independently the knowledge that will later be required in their professional work and in their transit through life, becoming then the training of skills in primary activity.

The special education is in conditions to take significant steps forward the quality of learning of students, including schoolchildren with intellectual disabilities, from the development of methods and procedures based on the Vigotskian principle of correction and / or compensation (Vygotsky, 1989), allowing in their development to achieve skills that allow them to communicate and interact socially in an adequate way.

Technological tools eliminate inconveniences of access to information and limitations in learning, allowing students to go at their own rhythm and style. In this sense, it is imminent to identify the applicability of ICT in strengthening the learning of people with special educational needs. (Easter Rengifo, Vargas Jara & Sáenz Núñez, 2015)

Currently , the information related to the formation of communication skills and social interaction in students with mental retardation in the province of Pinar del Río is done manually and in documents in *Microsoft Office* , causing deficiencies in the management of related information with the design of new activities (that facilitate the development of the skill to a greater extent), evaluations to the students, updating the file of each student, as well as the selection of activities based on the difficulties and particularities of each student, which it causes the human resource to be depleted, which must deal with information, delays in consultations and delivery of reports depending on the level of acquisition of the skill and delay in the selection of activities for each student , according to their characteristics.

Based on these limitations, with the support of ICT, the technological tool SIGFHAB (Computer System for Skills Training Management) has been created, with the aim of contributing to the training of skills in students with intellectual disabilities.

MATERIALS AND METHODS

To carry out this research we worked with group's sample of the province of Pinar de Rio formed by 12 students with intellectual disabilities from the Special School "January 28" and four teachers (teachers, heads of Cycle 4 to grade) of Special School "January 28".

Taking the dialectical-materialistic approach as the basis for analysis, methods and techniques were used that at different times contributed to the research process. Among the methods used is the historical-logical, which allowed analyzing, evaluating and taking positions in relation to the historical evolution of the process of skills training in schoolchildren with intellectual disabilities, and the inclusion of ICT for such purposes. The analytical-synthetic and the deductive inductive were used throughout the research process, from the bibliographic search, the capture of requirements, analysis and *software* development to determine the theoretical foundations of the research, as well as the concepts and theory related to the skills training process for students with intellectual disabilities in the Pinar del Río province, and the process of evaluating the proposed technological tool.

On the other hand, empirical methods were used that made it possible to characterize the state of the skills training process in schoolchildren with intellectual disabilities.

The documentary analysis allowed us to analyze how the development of skills is conceived in different documents of a methodological and normative nature, through the review of documents such as study plans, psycho pedagogical file, and language exploration sheet. Observation to classes facilitated verifying how the class contributes to the development of skills of the student with intellectual disabilities. The interview with teachers and administrators was used to obtain information related to skills training.

In addition, the methods corresponding to descriptive and inferential statistics were used, which made it possible, from the primary collection of data, to prepare frequency tables and reflect their behavior in tables and graphs.

The use of these methods allowed to formulate criteria on essential aspects of the object of study, among which deficiencies in the management of information related to the design of new activities for the development of skills, difficulties with updating the file of each student, as well as in the selection of activities based on individual difficulties and particularities, causing the human resource to be burdened who must deal with information, delays in consultations and delivery of reports depending on the level of acquisition of the skill and delay in selection of activities for each student, according to their characteristics are emphasize.

RESULTS

The process of skill formation in students with intellectual disabilities has evolved and is in conditions to take steps of progress in the quality of learning. For this reason, it was considered pertinent to carry out a diagnosis that shows results of their current state, taking into account the evaluations made by each of the members of the sample groups, yielding the following regularities.

The dynamics followed in the teaching-learning process for the use of facilitated language texts is insufficient; so are the teaching actions to take advantage of their possibilities in the creation of learning situations that favor the development of communication skills and social interaction in schoolchildren with

intellectual disabilities. There are also problems in the selection of activities depending on the difficulties and particularities of each student, as well as the level of assimilation.

Based on these limitations, the technological tool SIGFHAB has been created, focusing its operation on helping to improve the training of skills in students with special needs. The application was developed using as database manager MySQL, and PHP programming language and as a *framework* for laravel development. This ensures security for roles that were defined, allows the management and implementation of activities as well as the evaluation of these. In the same way, it proposes to the teacher the possible activities to be carried out by the students depending on their difficulties. The product obtained constitutes an important and novel achievement, supported by free software, which contributes to the training of skills in students with special needs.

The SIGFHAB technological tool constitutes educational software, which falls into the category of tutorials, since it presents the information, allows the formulation of interactive questions, as well as the answers and their evaluation, and supports feedback. It presents a friendly, readable and easy-to-use interface for users who interact with it, especially suitable for students with intellectual disabilities. It can be accessed from three different types of users: Administrator, Teacher and Student, with their corresponding functionalities depending on the role they play.

Administrator

The administrator user is in charge of managing the special educational centers in the province of Pinar del Río, as well as the groups corresponding to these educational centers. It is responsible for creating teachers and students and providing permissions to each user.

In entering their profile it is shown the amount of users registered, and from them, how many are students, how many teachers and how many administrators.

SIGFHAB generates by default the user formed by the following string name + identity card, and as password the identity card. Once the user enters their profile, they can edit it. In the case of students, the password is a master key, known to the teacher who attends it. It was considered appropriate to do so in this way taking into account the characteristics of these students, because they are children with intellectual disabilities, who can forget this type of data. Figure 1, I Main interface of the admin user, administrator displays the list of users registered on the technological tool, with their personal data and the role they play.

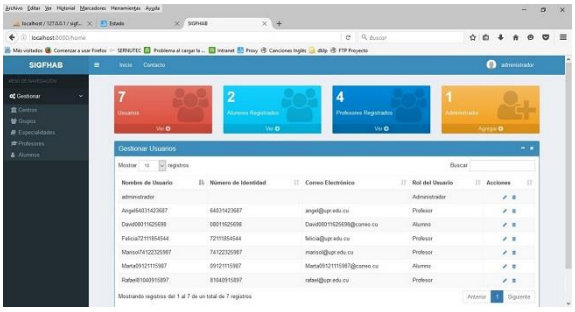

Fig. 1 - Administrator main user interface

Professor

The teacher user accesses a range of functionalities that SIGFHAB offers, facilitating the work in a satisfactory way. The teacher is in charge of preparing the activities to be carried out by the students. He has to accompany the students in the development of the activities and evaluate the answers given by them. It is their responsibility to update the psycho-pedagogical file that includes the skills and the language exploration sheet of each of their students.

Activities can be of various types: activities with facilitated language text; activities for the recognition of the family; activity for recognizing objects; activities for the recognition of letters; activities for phoneme recognition; activities for the pronunciation of phonemes.

Activities with text in facilitated language

For the development of this type of activities it is necessary for the teacher to manage previously the skills that the students must develop. Once incorporated the skills to SIGFHAB, draws up the activity, adding text and images that for its consideration , favor the formation of selected skills in students who are assigned the activity, and at what level of assimilation should be with the development of it.

The teacher is responsible for updating the record of skills of their students and, from there, define for everyone what are the skills which is necessary to work because they were not overcome.

SIGFHAB keeps a record of the activities carried out and the evaluations of the students, that is, the level of assimilation reached in the projected skill (s).

With this information, when faced with a new case of a student with a deficiency in the formation of a certain skill, the application searches for similar cases, that is , students who at some point presented the same difficulties ; Once found, look for the improved cases, tell yourself the students who improved these skills and propose possible solutions, showing the activities that allowed them to advance in the training of the skill, ordering them by the number of times that the solution was effective.

Family recognition activities

Activities for family recognition are individualized. The teacher incorporates into SIGFHAB photographs of children from the student's family and the relationship he has with them. The activity is displayed to the student so that they select the correct relationship for each photograph. The teacher can work with several photographs and can move them in position, thereby seeking to further consolidate the recognition of the family.

This type of activity allows individualized design for each student. High significance is attributed to it, since it is in the family where the student gets his security, empowerment, worth, accompaniment towards independence and autonomy.

Object recognition activities

For the development of the activities for the recognition of objects, the teacher must previously incorporate into SIGFHAB the names and images of the objects, fruits, animals of the student's daily life, identifying the category to which he belongs (living room, room, kitchen, bathroom, toys, fruits, animals, others). The teacher selects the images with which he will work and prepares the activity. He can work with multiple images from different categories, and can move them around by further

pursuing further object recognition. The figure 2 Interface activity management Recognition objects, sample how the teacher creates this type of activity, giving the possibility of incorporating the objects he wants to work and selecting students who perform the activity.

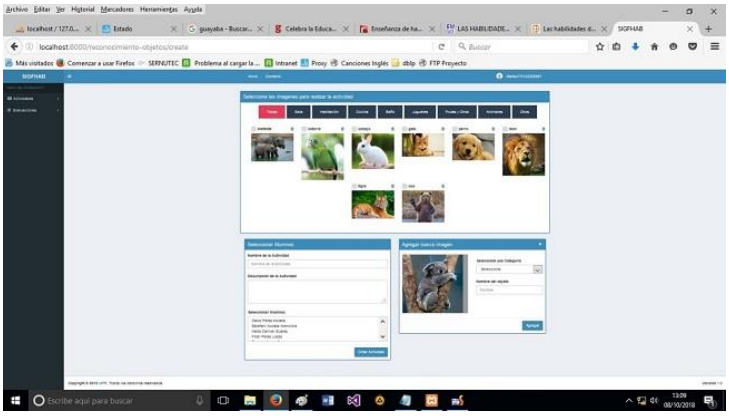

Fig. 2 - Activity management interface Object recognition

The design of activities for the recognition of objects allows the development of the student's evolutionary circumstances, which change, become different and cause increasing complexity, implying a slow change in the personalization processes, facilitating power and mastery over the objects in the environment, but also about him.

Activities for the recognition of letters

Spellings are the graphical representation system of a language, which allows the spoken language to be recorded with great precision by means of regularly arranged visual signs. It is the graphic way of transmitting information.

For the development of the activities for the recognition of letters, the teacher must provide SIGFHAB with the letter to be evaluated in the student, and must also provide a set of letters that will be shown to the student, from which they will have to select the correct, thus consolidating the recognition of spellings.

Phoneme recognition activities

Phonemes are the minimum articulation of a vowel and consonant sound. They are sounds of speech that make it possible to distinguish words in a language.

To develop activities for the recognition of phonemes the teacher must provide an audio pronunciation of a phoneme, and provide a set of phonemes that are shown to the student, within they will have to select the correct, consolidating in this way the recognition of phonemes.

Phoneme pronunciation activities

For the development of the phoneme pronunciation activities, the teacher must select the phonemes to be repeated by the students. The teacher must evaluate the students in three moments: the beginning of the pronunciation, the center and the end.

The teacher is responsible for updating sheet exploring the language of each of its students and, from there, to define

what phonemes are needed to improve in each student, and which part of the pronunciation of the phoneme is necessary to correct.

SIGFHAB keeps a record of the activities carried out and the evaluations of the students in each moment of pronunciation.

With this information, when faced with a new case of a student with a deficiency in the pronunciation of a phoneme, the application searches for similar cases, that is, students who at some point presented the same difficulties ; Once found, look for the improved cases, tell the students who improved the pronunciation of these phonemes and propose possible solutions, showing the activities that allowed them to pronounce the phoneme correctly at the beginning, center and end of it, ordering them by quantity of times the solution was effective.

Evaluations

The teacher, when entering his profile, receives notifications of pending evaluations. It shows you, in addition, a report on the assessments made showing in yellow color the total evaluations, in green those evaluated well, in blue the assessed regularly and in red the evaluated bad, for which he must reassign activities to these students , in order to overcome the objectives set. The teacher may ask SIGFHAB for suggestions of activities to develop to achieve the skills that students with difficulties have.

The teacher can see the list of his students with the number of activities assigned to him, those that he has answered and the evaluations that have been carried out, as shown in figure 3, Interface of evaluations to be carried out by the teacher. In addition, a graph is shown showing a percentage line of the monthly evaluations.

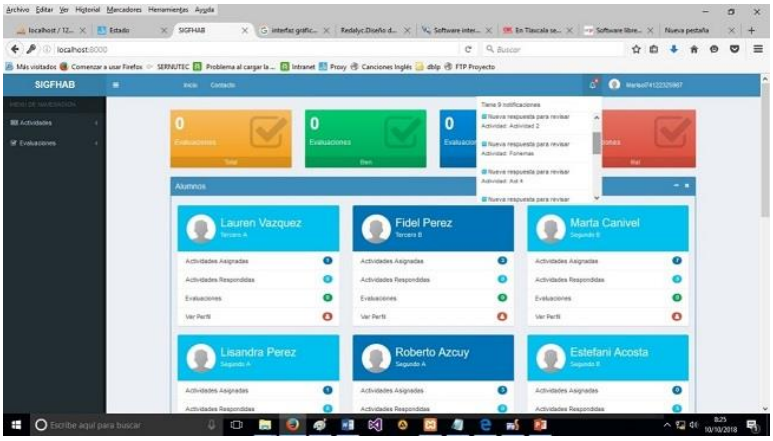

Fig. 3 - Evaluation interface to be done by the teacher

Student

The student performs each of the activities assigned to him, always in the company of the teacher, seeking to consolidate the training of skills. The figure 4 interfaces proposed activities to be performed by the student, shows that they are authenticated to the technological tool, the activities to be undertaken to contribute to skills training.

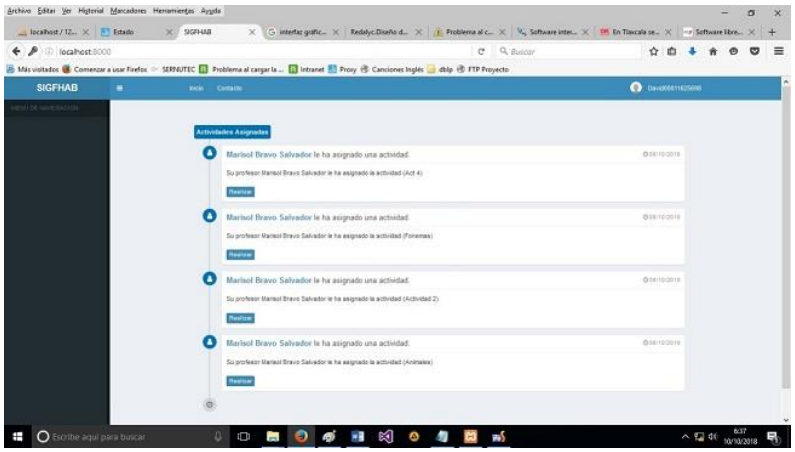

Fig. 4 - Interface of activities proposed to be carried out by the student

SIGFHAB presents an attractive, friendly, readable, functional and user-friendly interface for users who interact with it, especially suitable for children with intellectual disabilities.

It guarantees its consistency, requiring the same sequence of steps in similar situations, using the same terminology in messages, menus and the *web* pages that make up SIGFHAB. Each operation is accompanied by short messages indicating the action being performed. It offers the opportunity to insert data using boxes and drop-down menus instead of having to type each term, greatly facilitating and speeding up any task. The selection of icons contributes to a better understanding of the tool.

SIGFHAB has a help that guides users when they have any questions when working with any form. This help has been written clearly and in the user's language, with quick search possibilities. It is structured by books and content. This help format consists of a set of pages that implicitly include navigation between them.

SIGFHAB promotes the immediate updating of each student's file, as well as their language exploration sheet, providing the fastest way to keep information updated, speeding up the delivery of reports depending on the level of skill acquisition and delay in selection of activities for each student, attending to their traits.

As mentioned, it allows the preparation of different activities, in this way the actions of the teacher in the creation of learning situations are stimulated and multiplied, to favor the training of skills in students with intellectual disabilities.

Managing a history with the results that each student obtains in the development of activities with text in facilitated language and phoneme pronunciation activities, encourages the correct selection of activities based on the difficulties and particularities of each student.

This design of activities allows working with the distinctive features of each student, taking into account that they do not constitute a homogeneous group and, for this reason, it is practically impossible to argue in general the same teaching objectives, although one could speak of common procedures for teaching, bearing in mind that it is a very complex general process that ranges from decoding letters, through the pronunciation of phonemes, to understanding texts. The student with intellectual disability presents a language with limitations, hence the

importance of the tool that provides the possibility of managing comprehension activities from texts written in facilitated language and activities for the pronunciation of phonemes, since they act as structuring factors and regulate personality and social behavior.

DISCUSSION

The results derived from the study carried out, as well as the application of the exposed methods, demonstrate the need to deepen it, due to the importance that the training of skills in students with special needs reverts, as well as the contribution of the integration of ICT to this end.

ICT, as educational applications, are means and not ends. In other words, they are tools and construction materials that facilitate: learning, the development of skills and different ways of learning. (Ferreyra, Méndez & Rodrigo, 2009)

The ICT allow developing certain key points that will see us student and co - star of learning: increasing the motivation for awakening interest in learning and understanding, allowing the immediacy of transmitting and receiving information and providing a flexibility of rhythm and time of Learning. (Sevillano García & Rodríguez Cortés, 2013)

The integration of ICT into special education takes significance, because it facilitates comprehensive development, taking into account the educational needs of students with intellectual disabilities, allowing them to develop within the teaching - learning process in a dynamic, active way, becoming protagonist of his own training.

The advantages of using ICTs in training classrooms for people with special educational needs, make it possible to show that the contents can be presented in more attractive and appropriate
formats ; likewise , attractive content can be shown that they must complete with personal inquiry, enabling them to carry out self-correcting exercises. (Peña Beltrán & Aristizabal Ramirez, 2010)

The incorporation of ICTs makes possible the inclusion and integration of societies, at the same time that they become powerful didactic tools to strengthen capacities and abilities of the new millennium learners. (Román, Cardemil, & Carrasco, 2011)

The proposed product provides a range of functionalities that facilitate the development of activities related to the language facilitated, the phonemic processes, recognition of objects of daily life, the family and the letters, taking into account the needs of learners in need educational specialties associated or not with disabilities, which confirms their effectiveness.

This product responds to one of the demands related to the development of communication skills in schoolchildren with intellectual disabilities. Facilitates the development of activities related to given text, which provide a better understanding in students. Its contribution to the phonemic ear is unquestionable and allows the vocabulary to be expanded by recognizing objects of everyday life in different contexts of performance.

Due to the psycho-pedagogical characteristics of the student with intellectual disabilities, it is a tool that can be used by teachers in the process of language exploration and in the treatment of oral and written language disorders. This result has become part of the technological resources available to Special Education and Speech Therapy careers for attention to diversity.

Allows the student interaction with the computer application, always with the presence of the teacher, using aid levels to provide success in learning skills and test its performance.

The product has an unlike character, responding to variability in the development of school with intellectual disabilities.

The proposed computer tool facilitates the work of teachers, speech therapists, psycho-pedagogues who work in the educational care of schoolchildren with intellectual disabilities in the educational institutions of the territory. Its essence, as an enhancer of social interaction skills, enables the preparation for independent adult life of schoolchildren with intellectual disabilities, in addition to the development of computer skills.

It presents a friendly, readable and easy-to-use interface for users who interact with it; it can be used, in addition, in the process of training students in the careers of Special Education and Speech Therapy Education.

In general, it can be affirmed that SIGFHAB contributes to the training of skills in students with intellectual disabilities, facilitating the creation of materials that will allow internalizing the skills that they want to enhance, helping not only to work with the skill, but also to appropriate it, with the help of interactive materials that facilitate daily practice, working with the distinctive features of each student, in a way that contributes to structuring and regulating their personality and social behavior.

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Authors participated in the writting process of this article and in the analysis of documents.