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Trisomy 21: Contributions of the EKUI Methodology in the Literacy Process

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Abstract: With this study, we try to understand the impact of using the EKUI methodology on the literacy of a child with Trisomy 21. We carried out a case study, applied to a child attending the 1st year of schooling, supported by an action research methodology. Semi-structured interviews were carried out with the head teacher, the speech therapist and the parents, to collect information on the literacy methods used with the child. These helped us to plan the various intervention sessions that we later carried out with the child using the EKUI methodology. The results obtained show that this methodology has contributed to progress in terms of literacy, communication and inclusion, as well as reasoning and visual perception.

Keywords: Trisomy 21, EKUI Methodology, Communication and Literacy/Reading and Writing.

1. Introduction

Literacy is one of the most important and complex learning tasks for all children and in particular for children with Trisomy 21 (Berninger& Joshi, 2016; Lemons, C.; King, S.; Davidson, K.; Puranik, C. .& Al Otaiba, S.; &Fidler, D., 2018). Among the various literacy methodologies, the EKUI methodology has been gaining prominence. It is an innovative methodology, consisting of four forms of communication: handwriting, Portuguese sign language, Braille and phonetic alphabet symbols (EKUI Methodology. Available at: https://ekui.pt/# oqueeoekui-section Accessed on: May 7, 2020).

Thus, with this work, we intend to understand the impact of the EKUI methodology on the literacy of children with Trisomy 21, through the application of an action research project.

Literacy is a complex and vital process for full development (Gonçalves, 1996; Sim-Sim, 2006; Freitas, Alves & Costa 2007; McTigue, Schwippert, Uppstad, Lundetræ&Solheim, 2021). Knowing how to read implies studying writing, deciphering and interpreting meanings, recognizing and perceiving words and not just seeing the letters of the alphabet and putting them together into words (Sim-Sim, 2006). This process is complex and not innate, as such, it depends on a set of prerequisites, highlighting cognitive, perceptive and emotional maturity, which often does not follow the expectations and desires of family and educators (Lerner, 2002; Marcelino, 2008; Williamson, Patrick, Rubens, Moore, & Mindell, 2016; Zijlstra, Van Bergen, Regtvoort, De Jong, & Van der Leij, 2021).

In children with Trisomy 21, the fundamental requirements for learning to read and write are altered, both at a perceptual and cognitive level, becoming slower and inaccurate than in other children. These language deficits are central to these children's difficulties in communication (Rodríguez, 1996; Williamson, Patrick, Rubens, Moore, & Mindell, 2016; Berninger& Joshi, 2016; Lemons, C.; King, S.; Davidson, 2016; K.; Puranik, C. & Al Otaiba, S.; &Fidler, D. (2018).

Currently, there are specific literacy programs and the Portuguese Association of People with Trisomy 21 suggests the use of various educational programs. One of the methodologies is the EKUI, created by CelmiraMacedo (EKUI Methodology. Available at: https://ekui.pt/#oqueeoekui-section Accessed on: May 7, 2020) in the context of special education classeswith children with cognitive limitations. The author noticed that students identified the letters of the alphabet much more easily when associated with a gesture in Portuguese Sign Language (LGP). So she developed a methodology that would allow all children to learn and communicate in an accessible way. The innovative nature of EKUI involves reconciling the visual and phonetic component of learning and has an impact by helping children to read and write, while teaching phonetics, Braille, sign language and the alphabet.

The EKUI methodology was designed to develop literacy skills; language and communication; psychomotor abilities; critical thinking; social and emotional intelligence; imagination and creativity and inclusive attitudes. EKUI Alfabeto is an inclusive teaching material with a literacy and communication strategy for everyone. It was designed to work: visual and sequential memory; auditory discrimination; figure-ground

discrimination; language and phonetic skills and citizenship skills (Macedo, 2016). The effects in classrooms where the method is already being applied has been to break down barriers between deaf, blind and other students, who learn everyone's modes of communication.

2. Methods

Given the importance of the literacy process, particularly for children with Trisomy 21 and, given the potential of the EKUI methodology, we intend to answer the following question: what is the role of the EKUI methodology in the literacy of a child with Trisomy 21?

We paid attention to the association of phoneme and grapheme, the development of inclusive attitudes and respect, the development of communication and the acquisition of Sign Language and Braille.

Four secondary questions were also developed that helped us to materialize the problem of the EKUI methodology in literacy:

1. Will the association of the gesture to the phoneme (sound) and the grapheme (letter) present in the EKUI letters help in this acquisition?
2. Does it develop inclusive and respectful attitudes?
3. Can you develop communication?
4. Will it help with the acquisition of Sign Language and Braille?

We carried out a case study, applied to a 1st grade child diagnosed with Trisomy 21 and used an action-research methodology.

The student, at the beginning of the school year, benefited from universal measures as are the right of all students, but with the preparation of the identification form and the subsequent Technical Pedagogical Report (RTP), approved by the Multidisciplinary Support Team for Inclusive Education (EMAEI), the student also benefited from selective measures, under articles 8 and 9 of Decree-Law 54/2018 of 6 July.

The evaluation criteria - learning profile were adapted for the student and, as far as Portuguese is concerned, she had the following essential learnings:

<table>
<tr><th>Domains</th><th>EssentialLearning</th><th>Instruments evaluation</th><th colspan="2">weighting (%)</th></tr>
<tr><td>Speaking</td><td>- Respects discursive interaction rules.
- Listen to short speeches to learn and build knowledge.
- Produces an oral speech with some correction.
- Produces some speeches with different purposes, taking into account the situation and the interlocutor.</td><td rowspan="4">- Worksheets
- Individual work
- Group work
-Oral interventions

-
Quarterlyevaluation sheets</td><td rowspan="4">50

30</td><td rowspan="4"></td></tr>
<tr><td>Reading andwriting</td><td>- Knows the alphabet and graphemes.
- Appropriates new words.
- Develops knowledge of spelling.
- Transcribeandwritesentences.</td></tr>
<tr><td>Introduction toLiterary Education</td><td>- Hears reading and reads literary texts.
- Understands the essentials of the texts heard and read.</td></tr>
<tr><td>Grammar</td><td>-Discover regularities in the functioning of the tongue.</td></tr>
<tr><td rowspan="2">Attitudes</td><td>- Complieswithestablished rules.</td><td>Records</td><td>10</td><td>20</td></tr>
<tr><td>- Engages in carrying out tasks.</td><td>Records</td><td>10</td><td></td></tr>
</table>

Table 1 - Table adapted according to Learning Profile, 1st Cycle – 2018/19 – ASSESSMENT CRITERIA, 1st year.

2.1. Proceedings

Having ensured the ethical issues in the investigation, informed consent was requested from the school, the head teacher, the speech therapist and the parents. After approval of the study, we started by conducting three semi-structured interviews (Quivy&Campenhoudt, 2005) to collect information on the methods used with the child, namely the full teacher (A1), the speech therapist (A2) and the parents (A3) . This information was essential for us to plan the various sessions using the EKUI methodology. The sessions in which we interview directly were previously planned and designed to promote literacy, communication and inclusion skills in the child under study, always keeping in mind the assessment of the effectiveness of this methodology.

Regarding the assessment of the child under study, the following steps were carried out: an initial one, prior to the intervention, the pre-test, and another after the application of the intervention program, the post-test.

Based on the results obtained in the pre-test and on the data collected about the student in question, the intervention program was constructed. The previously planned sessions started with an introduction to the EKUI methodology; works of literacy and tactile discrimination were developed; knowledge of the alphabet and graphemes and the association of the grapheme with the gesture (sign language) and the phoneme (sound); the identification of syllables and new words with the EKUI letters in the EKUI App; visual discrimination and sequential memory; awareness of other forms of communication: Sign Language and Braille; fine motor skills and eye-hand coordination.

3. Results

We present the data obtained from the direct observations in each of the sessions held (between the months of September and December. We highlight that the student's reactions were recorded session after session with the student painting one of the faces, for example,  painting it green (in most sessions), when this happened, she showed a lot of curiosity and willingness either  by painting it yellow or red (which happened in the final sessions/with Braille).

During the sessions, the student was attentive to the explanation of what was intended, listening and looking in order to receive oral and visual information, never refusing to carry out the tasks. These activities were carried out by linking the word-image, writing words in the gaps, playful games, games on the tablet, among others, and always in conjunction with the head teacher (meetings every week).

During the various sessions, the following were worked: literacy, visual discrimination, sequential memory, tactile discrimination, eye-hand coordination and awareness of other forms of communication, cases of reading, writing, among other aspects.

TABLE 2

Session 1 – An introduction to the EKUI methodology was made. There was a first contact with the letters, being said several letters and the student repeated after the example. Literacy and tactile discrimination were worked on. The student was very attentive to the sounds and curious and showed a great desire to repeat.
Session 2 – We tried to know the alphabet and graphemes. Consonants "p", "s", "t", "d", "m", "b", vowels "i" "u" "a" "o" "e" and associate the gesture (of the language) and the phoneme (sound). The consonants and the words started by them were worked on, where the student began by identifying the letter, always very curious, asked how it was done in sign language. The fact that the cards have the image with the position of the mouth helps a lot in the student's visualization and its repetition. The EKUI app was also used, which proved to be very interesting and the student reacted with great curiosity and willingness.
Session 3 – Appropriation of new words and development of knowledge of spelling took place. Word formation with the cards: Father, Duck, Bread, Shoe, Bell, Ball, Uncle, Dice and Finger. The diphthongs: ai, ui, hey. The student identified several letters forming words from the letter "P". With the deck of cards she wrote the words already referred to. The ones the student found most difficult were Bread and Bell.
Session 4 – Visual discrimination and sequential memory were worked on by organizing the box with letters of the alphabet. The cards were mixed/shuffled and the student placed them in order on the table and then in the box. The student showed some difficulties in placing them in alphabetical order, but she was very willing to touch the letter and associate a word to the letter of it. Due to the letters having the grapheme and the phoneme it helped a lot in the visual discrimination.
Session 5 – Awareness of other forms of communication, sign language, was promoted. The student was drawing a letter and making the gesture for each letter. The student started by making her name in sign language, which also helps in identifying the letters. This activity allowed the development of motor skills and sequential memory a little, the order of the alphabet, with the student having some difficulties, but she never gave up. Here, the app was also used for greater interactivity and example/repetition.

Table 2 – Sessions using the EKUI methodology.

As can be seen in table 2, the data collected regarding the words acquired before and during the intervention and the evaluation of non-acquired words reveal the importance of interactions with the EKUI methodology.

Table 3

Words acquired before the intervention	Ana, father, mother, uncle, ball, cat, shoe, duck
Words acquired after intervention	top, motorbike, foot, bread, grape, egg, tree, book, cow, rug, yogurt, window, elephant, kite, clock, zebra, ship, cupcake, monkey, comb, glasses, door, doll, chair, bait, knife, drop, finger, sock, cheese, vegetable garden, radio, drum, bell
Unacquired words	chopper, kiwi, yo-yo, waffle, chopper

Table 3 - Set of worked words.

In fact, knowledge of the alphabet was still very much reduced to a few letters and words; of the 4 ways to communicate, the child only knew the spelling and phoneme, not knowing sign language and Braille.

The student knew some letters/spelling and some phonemes (mainly father, mother and uncle). Throughout the year, she developed them through the phoneme/grapheme association, with Sign Language and Braille.

All oral and written instructions form determinants for the student to carry out the activities and with the course of the sessions the process was more implicit. Activating and relating the various cognitive subsystems to the reading process was essential (Sim-Sim, 2006).

We found that writing, its assimilation and the automation of graphic patterns was facilitated through various activities (such as copying, trampling or punching letters, among others) (Berninger, V., & Joshi, M., 2016).

The phonological part had a great importance and was explored in several activities with the letters and we know, today, that phonological awareness is a vast set of skills that allow us to reflect on the sound parts of words (Freitas, Alves and Costa (2007) .

Another relevant point was for the student to use writing. Berninger and Joshi (2016) studying oral and written language suggested that writing by hand – forming letters – involves the mind, and this can help children pay attention to written language.

4. Conclusion

This study helped us to understand that with adequate training and a lot of insistence, the child with Trisomy 21 ended up expressing what she understood about the decoding of the text. Other skills, such as vocabulary, also emerged.

The EKUI methodology helped in the literacy/acquisition of writing and reading, being important in the acquisition of the alphabet and in the construction of words, in the association of grapheme and phoneme, in the association with sign language, although with many difficulties in Braille. It was also important in distinguishing phonemes, such as /p/, /t/, /d/. The repetition of several activities led to these results and the student's ability helps a lot in this acquisition.

It facilitated communication, because the acquisition of a faster and more efficient form of the alphabet/grapheme, of phonemes, allowed the child to recognize letters and words more easily. The fact that this methodology has four forms of communication helped the child to be included, almost unanimously, because, by learning to communicate in different ways, they will have more "tools" to feel included and thus facilitate the realization of the various activities and, also in socialization.

The student's progress was confirmed by the head teacher, the Speech Therapist and her parents. So, at the end of the sessions, she was already saying more words, keeping her gestures, which help in communication and communicate much more with everyone.

While the case study methodology used does not allow extrapolations to be made, the effectiveness of the intervention was, however, demonstrated by the successes obtained by the child under study, especially in areas that initially presented greater deficits. Another aspect worthy of mention, which in our opinion contributed to the evolution of reading, is related to the type of intervention carried out: an intensive intervention carried out by a specialist.

The results obtained point to the benefits of the EKUI methodology, contributing to the selection and organization of contents, which make the educational response adjusted to the special educational needs of each student.

Finally, despite the results being very positive, we consider it important that this study can be extended to significant samples.

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