Aspects of Teaching Portuguese and LIBRAS to deaf children using digital games as a mechanism to improve their motor skills and perspectives.

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Abstract - The objective is to train teachers of hearing impairmend students to implement LIBRAS educational software in Portuguese in their classrooms. Using avatar-technology and sign language, LIBRAS is an innovative and exciting software for digital games that helps students learn newer and better means of communication.

Keywords - hearing impaired child; avatar-technology; sign languages; educational games, Impaired Students Inclusion, Student Development.

I.   INTRODUCTION

The Deaf demonstrates that the deaf culture is composed of; language, cultural history, pedagogy of the deaf, arts, didactics and literature. Not only about cultural theory, but also the facilitation of meetings and other aspects, understood in the fields of post-colonial studies, such as: auditing, listening, deaf gain, the stereotype of disabled person, among others.

The culture of the deaf consists of language, history, pedagogy, arts, education, literature, etc. Not only theoretical aspects of the culture, but also, physical post-colonial aspects are important including x, y, z are noted.

The innovations in the technology area cannot be absent to any of the professionals in the IT or other areas that use them, as well as that of education, where it is essential to use this medium to help their teachers to develop their classes. However, something has gone unnoticed: the egalitarian way of presenting itself to society. With this, there is a need to give the same accessible opportunity to everyone's knowledge, this being the case of people with hearing impairment. [1]

Deaf culture is a universe that fascinates many people who have the privilege of living with these individuals. This is a different path from many that we have known throughout our lives, marked by the controversial side that deaf learning of the Portuguese Oral Language (OPL) evokes, which thrills teachers in a rewarding way when deaf children attended begin to express their first gestures or to write your first words in Portuguese. It is important to clarify that learning to (LPO) does not prevent learning the Brazilian Sign Language (LIBRAS) and vice versa.

From the moment we have this understanding that they are two different languages and that they can be part of the reality of many deaf people, learning as early as possible, becomes real and can happen. We are aware of cases that, for some reason, oral language may not be developed or develop beyond expectations. For this reason, the deaf child must be stimulated early to discover that having access to the sound world, within its physiological possibilities, can give him pleasure, and for this it is necessary to constantly use his electronic device (hearing aid), and must remove it. just to shower or sleep.

Wearing a hearing aid does not mean that the child is deaf. The individual is classified based on the results of an audiometry exam that are inserted and illustrated in a type of graph called Audiogram. With this, it is possible to provide the reading of the child's hearing level and type of hearing loss, showing the minimum audible level (auditory threshold) that the person listens to and at what frequency (low, medium and high).

In the illustrated Audiogram, it can be seen that on the left are the low frequencies (thickest; 250Hz, 500Hz), in the middle are the medium frequencies (1000Hz, 2000Hz, 3000Hz) and on the right side the high frequencies (thin; 4000Hz, 6000Hz and 8000Hz). For each type of sound, there is a minimum level of hearing, which is measured in Decibel (dB). (Figure 1)
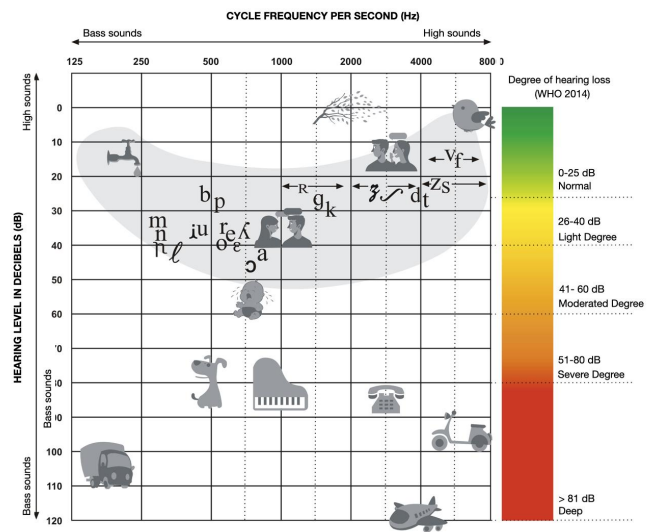

Figure 1. The gray band in the graph is called a speech banana. In this range we find the speech sounds distributed by frequency and intensity in the Portuguese language. It is in this range that the human voice is heard. We can find mild, moderate, severe or profound hearing loss. However, it is important to know that not only the degree of loss interferes with speech understanding, but also the configuration of the audiometric curve. It is very common for deaf people to have normal hearing or mild loss at low frequencies and greater loss at high frequencies. Cases like this make the patient feel that he listens, but does not understand. That is why it is always important to perform an audiometry with a speech therapist so that you can clarify how your hearing is doing.

With this theoretical basis, the teacher motivates deaf students to achieve their goals in social life, showing the importance of culture and sign language, so the use of games should be valued in the process of learning the same "*With education, we can have an exchange of knowledge and develop competence with the best skills that can provide good opportunities for a better future in the job market [4], minimizing exclusion where, once the individual will choose the pace that will be taught, the content to be presented or for any reason cannot be present in different courses, they may have fulfilled their expectations, desires and desires, even for those who have little knowledge of information and*

communication technologies". In this sense, it is expected that the teacher, who acts with specialized services within his competencies, will explore digital materials and also resources existing in classrooms to develop classes that are tailored to this audience with these different needs, making it possible to transmit knowledge from the classroom. as clearly as possible [2]. Alnafjan et al. [3], shows that education is making use of new information and communication technologies, which has enabled accessibility to education throughout life for anyone who wants to have an active participation as a citizen in a society, providing a better quality education.

With education, we can exchange knowledge and develop skills with the best skills that can provide good opportunities for a better future in the labor market [4], minimizing exclusion where, once the individual will choose the pace that will be taught, the content to be presented or for any reason may not be present in different courses, they may have met your expectations, desires and desires, even for those who have little knowledge of information and communication technologies. The number of students with hearing impairment in elementary school is still minimal, but we have already heard a lot that hearing impairment does not have any problem or intellectual impairment, however the question would not be this, but rather, how this student can understand what is presented and then put into practice. The importance of this research is to emphasize a situation where it is not only to reflect, but also to concern society on this subject, and especially to show the struggle of these people, who want to have an active participation in the market, in building a better and more just society, only they want what is right, and they don't want to be led to accept impositions from those who think it will be better for them or not. They want to be heard, to show that their needs really must be met.

II. MOTIVATION

Everyone has rights, with or without special needs, to access to education, health, work, leisure and other resources that are necessary for full development and coexistence in society as a human being. Over the years, the need to improve the education of the deaf has been observed.

During these past 15-20 years, numerous academic as well as popular digital gaming stories have been published. Currently, the Internet is probably the most important area for these representations of the past, in many cases the public mixes collectives, individuals and particular elements of game stories and comprising at least three different patterns; namely, history, heritage, and retrospective speeches. The game is a complex and fun activity, wider than a physiological phenomenon or a psychological reflex, it is a specific and voluntary form of activity that has a social function [4]. The term game, in the broadest sense, can have several applications: play, challenge, learning, etc. [1].

Figure 2: Representation of teaching through digital games.

Educational digital games are a tool that, when well planned and structured, promote learning and skills to the student. The game improves the development of creativity, critical sense, participation, "healthy" competition, observation, concentration and various forms of language use and satisfaction in learning. Medeiros et al. [5] states that "games are a powerful resource for stimulating the integral development of the student. They develop attention, discipline, self-control, respect for the rules and perceptual and motor skills related to each type of game offered ". There are some factors to note, such as the advantages and disadvantages.

- Advantages: Motivation for the student to develop decision-making, evaluate the decision made, socialization among students, teamwork, allows the conciliation between two subjects, improvement of the student's imagination, good assimilation of the content, etc.

- Disadvantages: lack of physical structure of the environment (micro and internet), ignorance and unpreparedness of the teacher, prejudice between students or teachers, price of games, ignorance of the pedagogical aspect of games.

With the popularity of computer games and videogames in the general population rising more and more, he has a greater interest in their uses and effects in academia, particularly in social psychology, education and the media. Because, a multitude of cognitive, emotional and behavioral processes are involved in playing, games can be useful when examining the concepts of psychology. Games, being highly complex and dynamic media, introduce new challenges to the methods of researching the effects of media and make great demands on the capabilities of scholars.

The experimental evidence associated with digital games in the field of education shows that they are becoming famous among educators at different levels of education, such as: primary education (EP), high school (EM) and higher education (ES). The synthesis of studies carried out between 2000 and 2014 showed that 37 games were used to teach in the field of Health, 30 games in Social Matters, 29 games in the magazine "Science", 16 games in Mathematics, 15 games in Languages, 8 games in Computing and 3 in Engineering. This demonstrates the use of digital games in a variety of different subjects and the increased level of interest in the area of digital games indicating that there is a requirement for future research directions to move the field forward.

Social play is an important component of the digital gaming experience, although there is an understanding of how the social context influences the gaming experience, we still know the least about how the gaming experience influences the social experience. Specifically, it is not yet known whether winning or losing affects a player's sense of social presence with his fellow players. Here we are presented with

the results of two studies aimed at exploring this interaction. The first study is based on a laboratory that analyzed whether the social presence varied in teams placed playing team-based games, depending on whether they won or lost, whereas the second study is a user search experience, which measures how variables in the context of gameplay affected social presence through a number of team-based online games. The results of both studies show that when teams lose, the negative impact on social presence is greater within teams than between competing teams. This has implications for studies as in this area must be analyzed and also, through an analysis of individual games, suggests that the mechanisms in the games can lead to reduced social presence [2].

People have different skills to manage abstractions, in the case that those who understand abstractions easily are able to understand concepts, principles and theories almost effortlessly, people who learn by example, prefer to understand abstractions by solving concrete problems that allow them to exercise abstract principles. Knowing a person's skills to manage abstractions is important because it has been shown to be correlated with career preferences and skills, management styles, learning styles, and various behavioral trends as explained by [6].

III. RELATED WORKS.

Recent research related to the applicability of learning based on digital games has advanced a lot. However, different methods used to assess their effectiveness have yet to be consolidated, which leads researchers to doubt the credibility of certain methods. This motivated researchers to look for efficient ways to validate the real efficiency of the method, thus generating procedures, techniques, tools and strategies aimed at this end [3].

Digital games have become an important tool to improve health behaviors and provide great assistance in providing care to education. Despite several different definitions, the main items that make up a game include objectives, rules, tasks, interactions and challenges. In addition to that, games, unlike work, are designed to be 'fun', so when aligning the objectives to education we have a great tool, able to hold attention and generate pleasure when learning, offering highly engaging content at the level of information capture increases proportionally. There are some divisions between digital games such as gamification (the use of game design components outside of game contexts) and 'serious games', usually defined as (video game games). Each offers opportunities for sophisticated engagement of participants in technology-based behavioral interventions, gamification and video game interventions (referred to as digital games) have proven effective in affecting behaviors related to health promotion and disease management, including areas such as depression, asthma, diabetes, cancer, nutrition and sexual health [7].

A. *Application of games for the elderly.*

It must be considered that digital games have to be tested in non-laboratory conditions, by users with different cultural backgrounds and ages in order to understand and evaluate how playable, meaningful and attractive the experience of playing is. In this case, digital games were applied to help elderly people, where many of them had no interest in playing, as they said it was silly to use this resource. After some time after having contact with him they started playing it frequently and without realizing they reached periods of 2h playing, one of those games showed who knew more neighborhoods and so they could show in a very broad way the help that the tool it was possible to learn from them, and how it provoked the feeling of these people with positive results [8].

B. Anxiety and depression..

Technology based on interventions in health (or e-health), were developed to overcome some deficiencies of face-to-face therapy, because it has the potential to reach a wide number of individuals, reducing long waiting lists, and making treatment stay available at any time of people's day. Psychological internet-based therapy (particularly online therapy based on cognitive-behavioral principles) has established a solid empirical basis for clinical and patient acceptability. In countries like Australia, Sweden and the Netherlands, they offer good examples of how digital interventions offer alternative ways of accessing care and show how to successfully implement these interventions alongside traditional mental health systems, in this way several people with depression and crisis problems of anxiety had an improvement in their clinical condition, thanks to the use of digital games [9].

C. Cancer Treatment

Digital games are a very powerful interaction tool that supports the optimal operation of the attendance management program in all dimensions. In fact, the digital game is the practical application of technology in providing care and cost-benefit to different knowledge entities. Games are now a dominant form of media even larger than the film industry and are appreciated in terms of gender, age and cultural limits. Health games provide a means of attracting attention and promoting changes in health and related behaviors. Health electronic games have been on the market for more than 32 years, starting with the launch of the Atari Joy Board in 1982, a precursor to Wii Fit. Today, more than 300 games of this type have been developed for consumers, patients and professionals. These games have different types depending on the purpose they were designed for. Health games are among the most proposed, on purpose, to transfer information, health and care teachings, practices, transfer values, ideas and mental teachings in the ideal method to ultimately improve behavioral, physical, cognitive and emotional functions analysis, are designed to manage the disease [10].

Figure 3: Representation of a child diagnosed with cancer being taught through digital games during treatment.

The game mechanics are mainly adapted to involve and motivate patients, transforming them into players, highlighting the skills acquired through scores, and thus, making

the therapeutic process more fun than usual. Other social dynamics borrowed by games can facilitate the development of networks between patients, creating social connections and virtual communities, which could be powerful clinical resources for elderly patients. Since these games have to face a preliminary challenge, which is their acceptance by a population that is not used to this environment, and thus perform exercises through these games to optimize their health opportunities [11].

D. Education of the deaf using games in other countries.

Of 360 million people with hearing impairments, 32 million are children, representing 5.3% of the global population. 720,000 people are classified as deaf, with total hearing loss or with a part according to statistics from the Saudi Arabian Ministry of Economy and Planning. Although these hearing impaired people form a significant proportion of the largest population in the Arab world, these people face several challenges that limit their ability to participate in paid daily communication. Some of the affected areas include education, employment, social life, health care and entertainment. One of the biggest educational challenges for these people is the lack of educational materials that are in line with their needs [3].

In India, a survey was developed, where [12] realized that something was missing to improve the education of children with hearing impairment. It could be poverty, while it could be illiteracy among people with disabilities who are deaf and dumb. Thus, the author proposed the creation of an Android application to be able to help these children to be able to have a social life, to be able to go anywhere and communicate easily with other people, the application recognizes people's voice even when they are offline , in this way the Google application, recognizes the person's voice and converts it into text, and in this way the application transcribes the text into signs for children to be able to understand what was informed.

E. Education of the deaf in Brazil

In Brazil there are about 9.7 million people who are deaf or hard of hearing. Also, about 30% of the Brazilian deaf community is illiterate in Brazilian Portuguese due to difficulties in offering deaf children an inclusive environment based on bilingual education. Currently, current teaching practice depends heavily on verbal language and written material, making the inclusion of deaf people a difficult task. The author to combat this problem and improve the accessibility of deaf students to written material, in order to help them master Brazilian Portuguese as a second language. We describe an ongoing project that aims to develop a Brazilian Portuguese to Libras machine translation system that presents the translated content through an animated virtual human, or avatar. The document describes the methodology adopted to compile a corpus of source language with the needs of deaf students in a central focus. It also describes the construction of a parallel Brazilian Portuguese / Brazilian Sign Language (Libras) corpus based on motion capture technology. The planned translation architecture includes the definition of an intermediate language to conduct the avatar. The results of a preliminary assessment of the intelli-

gibility signals highlight the application potential [13]. As an example of games, we can mention the game MemoSign is an educational computer game designed to boost vocabulary acquisition for deaf children in both signed and spoken written languages [14]. Using a 3D avatar signature, MemoSign the game could offer additional support for learning sign language notations, in the well-known SignWriting system (SW), and this, making its content in the visual-gestural modality. The game interface includes eight pairs of colored cards. The deaf player must only turn over pairs of identical cards, which have the same meaning, with as few rehearsals as possible. Blue cards hold SW notations, while green cards hold your description in the written language. When the player turns over a card that maintains a SW notation, the virtual signer begins to interpret its notation content in visual-gestural modality. The game ends when all the cards have been matched. Within these different types of assistive technologies, the use of animated 3D avatars has been identified as a successful practice that can support the teaching of literacy to students who are deaf or hard of hearing [14]. These digital agents have the potential to act as a powerful means of communication for students to display knowledge in their first language and make teaching materials completely accessible to them. In addition, when appearing on the screen as embedded entities, whether human beings, or anthropomorphized characters and animals, these agents can effectively increase students' attention and motivate them to maintain interaction with the content presented. Currently, software for creating signature avatars has been developed and applied, in an increasing number of countries, to generate three-dimensional [14].

Figure 4: Board game with accessibility in Libras and Braille
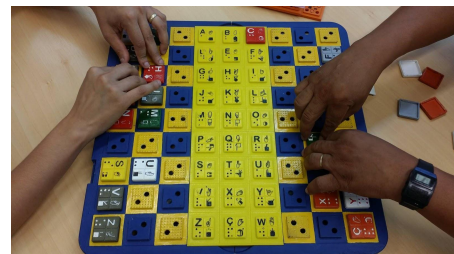
IV. METHODOLOGY.

It refers to an extensive bibliographic review that had the following guiding question: How is the acquisition and language development of the individual with hearing loss? After clearly defining the objectives, the following steps were taken: identification of the theme, definition of descriptors, search in the literature, categorization of studies, evaluation of studies included in the review, interpretation of results and synthesis of knowledge evidenced in the analyzed articles, as proposed in the literature .

Searches were carried out in the CAPES database for access to indexed journals on the subject of interest published in the period from 2016 to 2018, with the search being carried out in the period from April to May 2018. Descriptors in health science and digital games were used searched with the keywords: "hearing", "children's language", concept of digital games, digital games to help children, hearing loss "," libras language "," phonology "and" vocabulary "in Portuguese, English, Spanish and Pounds.

The following inclusion criteria were established: studies carried out with hearing impaired children and adolescents or with a focus on the language development of this population; articles published in English, Spanish or Portuguese; and complete original articles. The initial search indicated 374 articles of which 182 articles were selected for analysis based on the application of the inclusion criteria and, after reading the title and abstract, 33 articles remained. These were read in full and in the first stage (application of the first evidence matrix) 23 articles were selected.

V - RESULTS AND DISCUSSIONS.

The process of analyzing the articles revealed that language development is directly related to the advancement of auditory skills. Hearing loss causes damage to language development and the greater the degree of hearing impairment, the greater the difficulty of speech assimilation and discrimination, as well as the greater the language deficits. The scientific productions analyzed also revealed a wide variety of tests used for language assessment. However, it appears that there are still no protocols with specific normality standards for people with hearing loss, with the intention of analyzing the language development of the child with his hearing condition. Regarding the methodological analysis, it was observed that most of the articles analyzed exposed fundamental information, mainly in the items: title, summary and introduction.

VI - FUTURE WORKS

After reading several articles, we can highlight how important and current the theme of inclusion of children is through digital games, using Nética, we could observe some children with hearing problems and from their performance in the game we would create a Bayesian network with the information collected. Of course, this information varies from person to person, as each child will have a certain level of difficulty in the game, whether in understanding or mobility. After the Bayesian network was created and applied in Nética, we could take as a result how effective that child was in the game and after a deeper analysis of its result, highlight what he could improve to improve his performance in it.

A. *Application example*
B.

Figura 5: Animal characteristics
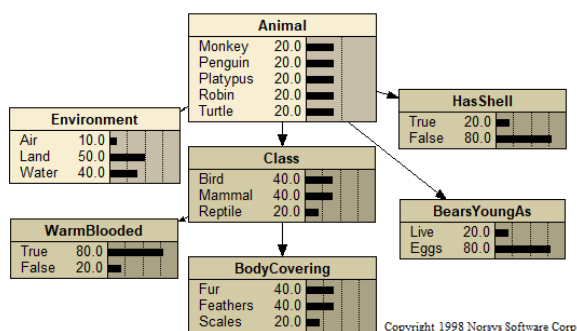
Above we can see a Bayesian network using Netica to describe through statistical probabilities what type of

animal it is, we can observe several characteristics that were raised to let the system provide us with the statistical result, being: What animal, what type of class it belongs, its habitat.

Figura 6: Animal characteristic
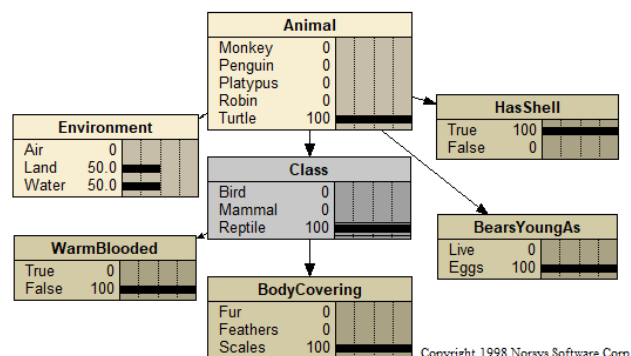
Now, we can notice the network again, only this time selecting a characteristic. It is possible to observe that Nética managed to return the concrete data according to the characteristic you select, to build such an application, we have to have an expert on the subject, responsible for weighing the data between the variables in the correct way, in order to perform tests and arrive there is a concrete answer.

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