Learning based on thyphlo technology through the methodology STEAM– í

Luciana Dalila Coronel de López[1] and Nohelia María Dolores Ríos García [2]

1 Polytechnic Faculty – National University of Asunción, Mariscal Estigarribia Road, San Lorenzo, Paraguay
2 Faculty of Philosophy - National University of Asunción, Avenue Carlos Antonio López and Juana de Lara Route 1 Km 192, San Juan Bautista, Paraguay

Abstract

Higher Education in Paraguay offers countless careers in different specialties, covering all areas of knowledge. Currently, the public educational system is supported by financing from the Paraguayan state. This free program is favoring young people who could not access an institution. superior. However, thinking about inclusion, it is unknown that people with visual disabilities can access a university degree in any state institution, because they do not have the infrastructure or trained human resources to serve students with visual disabilities who are competent in the field. area, using STEAM-i (-i: inclusive) methodologies. This work aims to propose a proposal for educational innovation in universities for equal and inclusive access to education for all citizens.

Keywords: Education, inclusion, methodology

1. Introduction

Paraguay through Law 5136/13 On Inclusive Education "identification and minimization of barriers to learning and participation, and maximization of resources to support both processes" [1] as well as Law 4995/13 on Higher Education, section II Principles of Higher Education in section g mentions equality of opportunities and conditions in access to the benefits of higher education [2].

Until the closure of this research, there was no knowledge of the existence of a Thyphlo technology laboratory in state universities. In that sense, this project represents a challenge because it will allow the inclusion of an inclusive educational model in compliance with the legal framework.

This work focuses on the approach of a generic innovation proposal for higher education that can be adopted in any higher education institution that has the necessary infrastructure, technology and human resources.

Science, Technology, Engineering, Arts and Mathematics (STEAM-) i (-i: inclusive) is the creation of the author, a doctoral student in Education with an emphasis on Higher Education Management, until the date of presentation of this project, there has been no knowledge of the existence of another STEAM-i (-i: inclusive) in the country [3].

Tiflotechnology presents another perspective of teaching and learning with a view to innovation with the implementation of games, demonstrations and simulations to develop capacities and skills related to each subject in virtual environments, demonstrating the good use of the technological resources available to students with integrators. of inclusivity where the linking or creation of research groups in various areas can be generated.

1.1 Objectives

General objective

Present a proposal to universities for the creation of a tiflotechnology laboratory based on the acquisition of technological equipment that allows the preparation of teaching materials and development of programmatic content of the different disciplines, using the STEAM-i methodology.

Specific objectives

• Highlighting the resource of typhlo technology in the institution
• Demonstrate the importance of having a Thyphlo technology laboratory in Higher Education in order to respond to the needs of people with visual disabilities.
• Instruct teachers in the preparation and development of content of related subjects, using STEAM-i methodologies.

1.2 Problem statement

Paraguayan Education has an outstanding debt with people with disabilities, there are several institutions in the country that offer higher courses to people with different disabilities, however students with visual disabilities do not have a Thyphlo technology laboratory so they can develop their classes. Currently, the few students who can access a university degree, carry out their subjects under the shadows of knowledge with several obstacles, this represents a hard blow to education, to family members, to society and therefore to the country.

The educational situation in the country is complicated. This problem is denoted from initial, basic and higher education. According to data extracted from the MEC, in its Single Student Registry (RUE) in 2018 there were 628 students with blindness and 6,405 with mild blindness, meaning that a high percentage of these students have dropped out and the few who were able to complete high school They no longer access higher education because the higher education system does not have the tools or human resources to receive them. While, according to the World Health Organization there are four levels of visual acuity: normal vision, moderate visual impairment, severe visual impairment and blindness. This organization considers that there are around 314 million people with visual disabilities in the world, of which 45 million are blind. Of this visually impaired population, 87% live in developing countries [4]

Visual disability is the most frequent in Paraguay with 22.1%, according to data extracted from the National Institute of Statistics (INE) in 2021. According to Skol Paraguay in 2021, more than 250,000 blind people were registered, practically 3 out of 10 Paraguayans have a visual disability. While the Vision Foundation has registered approximately 30,000 blind people by 2022 [5] Due to the aforementioned, it is not responding to the needs and demands that students completing high school will require. Concerned about the percentages that are evident, members of the Research Group on Technologies Applied to Education (GITAE- Group in training), present this proposal.

2. Methodology

It seeks to produce knowledge from the development of a concrete practice based on the experience of other countries in search of raising awareness among teachers, learning new ways of teaching, to solve practical problems, generating examples for an entire nation, through the tiflotechnological tool.

The design of the work corresponds to a pre-experimental one because it consisted of a pilot test, seeking to acquire knowledge in the use of tiflotechnological tools, as well as an analytical investigation because it is demonstrated with reasoning based on results, evidencing the current need for creation of a Thyphlo technology laboratory for higher education.

According to its depth, this research is exploratory because it allows the discovery and explanation of new data, including the use of new technologies and learning to make known the original situation and the one analyzed. In this sense, it is important to mention that Festinger and Katz already in the year (1953) [6] had defined the exploration phase as a period of informal and relatively free research, during which the researcher tries to achieve an understanding of the important aspects involved in the situation.

It is qualitative-quantitative in nature because it allows us to understand the complex world of experience from a people's point of view.

The techniques correspond to documentary analysis using primary and secondary sources, in addition to conducting surveys, focus groups in order to understand the importance why other countries have already implemented it for years.

The study universe was made up of five people with visual disabilities of tertiary education age. On the other hand, a survey was applied to 50 (fifty) students selected in one of the Faculties of the National University of Asunción that make up an important segment to enrich this research and the data analysis consisted of recording and tabulating the data, These are presented in tables and figures, the primary data will be collected in various periods of time, then they were loaded into the Excel program, which allowed the results to be graphed in percentage numbers with a NC=95% and a ME=05%.

3. Expected results

3.1 Strategy for implementation of the proposal

The scope of this proposal will consist of a very valuable contribution to society and especially to the development of inclusive education in Paraguay, responding to people with visual disabilities.

There are several tools to serve people with visual disabilities, such as Word or PDF, an access menu that has plain texts, audios, audiobooks, images with descriptive text, explanatory videos and printed texts in Braille format. Likewise, the availability of technological infrastructure such as computers, tablets and cell phones that have screen readers installed such as JAWS, Daisy, Magic, digital magnifiers, Talkback, Voice Over, Castillo, Cotacio, Ortiz, & Medina [7]

For this proposal, it is intended to use free software such as: contrast-finder, VDA; screen reader, JAWS; screen reader, VoiceOver; which is a pre-installed screen reader for macOS and iOS, Narrator; screen reader; Killer whale; It is also a screen reader and others.

The strategy to implement this proposal is as follows:

• Infrastructure adaptation: It consists of the acquisition of new equipment or adaptation to acquire the necessary equipment.

• Teacher training: It consists of the training and preparation of knowledge, skills and abilities for teachers for the correct implementation of tiflotechnological resources.

• Monitoring and evaluation: Consists of constant monitoring during the implementation of educational innovation, taking into account the degree of implementation, age of the content, and student action.

The support of the directors of the university that wishes to implement this innovation will be key to the process, because exclusive dedication will be required to carry out the activities of this proposal. It is considered relevant and viable, because it is expected to achieve an impact on the entire the inclusive community, in society, in the country and internationally, collaborating with the construction and transformation, marking an icon in the history of higher education and that will be transmitted from generation to generation at all times. In addition, it will generate an incentive for people with visual disabilities to complete their secondary level studies and continue with a university degree. The potential beneficiaries would be people with visual disabilities who want to access a university degree. Likewise, the Paraguayan state, educational institutions and society in general because they are going to respond to this very vulnerable issue that is inclusive education in Paraguay aimed at improving educational models.

Educational institutions must strengthen collaborative work between national and international peers, and agreements, agreements, among others, could be signed. [8]

In the university context, we will contribute to the improvement of the program content of various disciplines through the use of technological resources that allow inclusion.

The proposal can be implemented in any higher education institution, for the contextualization of the proposal, it can be specified, it will begin with a diagnosis in the Faculty to be projected at the National University of Asunción, Paraguay, in order to know some aspects.

Firstly, part of the result of the interview is presented, carried out with the five people with visual disabilities, four males and one female.

Have you asked if they intend to pursue a university degree?

The five people have mentioned that they would love to fulfill one of the dreams they have, that of being able to obtain a university degree.

Have you been asked if you are aware of some UNA faculties, do they have a protocol for caring for people with disabilities? And, in response, the five have indicated that they do not know.

On the other hand, they have been asked what tools they might require to participate in the classes?

It gave rise to field work carried out by UNA students, which consisted of recognizing the technological resources for the creation of a typhlotechnology laboratory.

Table 1.
Technological resources at National University of Asuncion

| Technological resources	You have	You don't have	You don't know
Physical space in laboratories	47	1	2
Braille system	0	10	40
Bibliographic materials in digital format	38	3	9
Computer with specific software	44	5	1
Voice recorder	0	7	43
Earphones	45	5	0
Cramer Abaco (Calculator)	7	9	34
Talking calculator	0	15	35
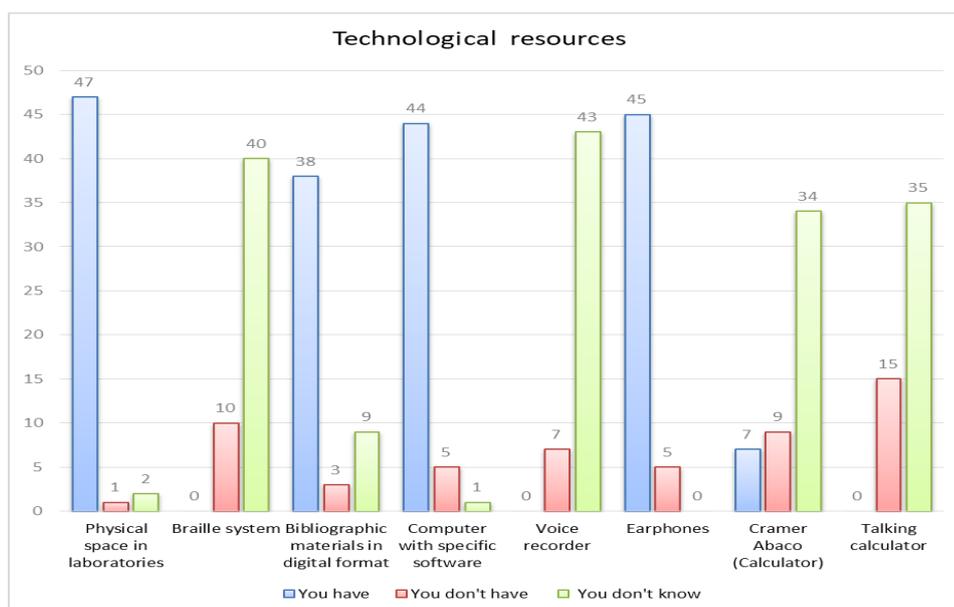
Figure 1. Technological resources. Source: self made

The next result consists of appreciating the factors that may influence the creation of a typhlotechnology laboratory in one of the Faculties of the National University of Asunción.

Table 2.
Incidence factors for the creation of a laboratory.

Incidence factors	Lots of incidence	Little incidence	No incident
Equipment not available for purchase	50	0	0
Financial drawbacks	48	2	0
Lack of will on the part of the faculty authorities	45	5	0
Lack of knowledge of the Authorities on the subject	44	5	1
Impossibility of acquisition due to lack of space	43	7	0
Means to develop strategies and content in the curriculum	45	5	0
Insufficient human resources	10	6	34
Low assessment of respect for human rights	43	7	0
Communication opportunities and content	13	5	32
Formalization of communication activities (absence of manuals, protocols, regulations)	47	1	2
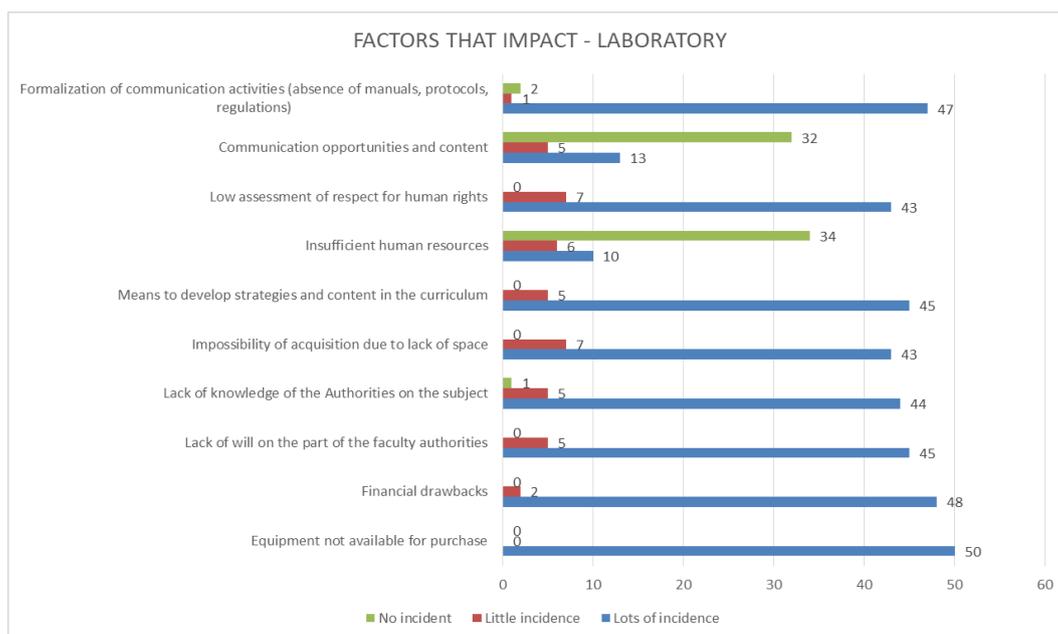
Figure 2. Factors that influence the creation of a laboratory.

4. Discussion

When analyzing the data collected through the interview carried out with people with visual disabilities, it is evident that they have every intention of entering a university degree, they have mentioned that, if there is political will on the part of the government authorities and institutions Everything is possible, and the tools required are not so expensive or difficult to acquire. In this sense, the training processes for officials, teachers and others must begin, as well as adapt the infrastructure or renovation of a Thyphlo technology laboratory room.

Regarding the questionnaire applied, it can be highlighted that most of the faculties have a significant physical space, with sufficient capacity to receive students with visual disabilities, in terms of digital bibliography, they have a digital repository with information resources, computers,

They have specific software for the different disciplines, they have hearing aids and in terms of specific technology such as the Braille system, Cramer abacus, talking calculator, the vast majority have stated that they do not know whether or not they have the ability to use these tools, because they have not implemented it or they simply do not have it.

Considering the factors that may influence the creation of a tiflotechnology laboratory, the following factors could be highlighted. It is a factor of great negative impact that the university cannot have funds for the acquisition of specific equipment, as well as the lack of will to authorities and commitment with respect to the project, the authorities' lack of knowledge of this methodology is also a factor that has a negative impact, the lack of tools and equipment for the creation of inclusive content, the contents of the curriculum that are not adapted to the specific needs of people with visual disabilities is also a factor that has a negative impact, other factors are the low valuation regarding human rights and communication opportunities.

5. Conclusions

With this proposal for educational innovation within higher education institutions, we seek to develop and propose a tool for the construction and implementation of quality education that serves people with visual disabilities, using tiflotechnology through the STEAM-í methodology.

In this sense, information and communication technologies play a very important role in offering learning alternatives to people with disabilities, interaction, learning feedback, content distribution, access to information, among others.

This entire process will result in the general well-being and autonomy of the student by acquiring a sense of freedom and participation.

For a correct implementation of tiflotechnology tools, it is necessary for the educational institution to invest in infrastructure and teacher training for the correct inclusive teaching-learning process.

Likewise, one of the minimum quality criteria will be met in the National Model for Evaluation and Accreditation of Higher Education, which specifies the regulations related to inclusion in Higher Education, some points related to the accreditation processes of the Higher Education. quality of existing careers in Paraguay. The National Agency for Evaluation and Accreditation of Higher Education (ANEAES) is the technical body of the State in charge of fulfilling the specific tasks of systematically verifying and certifying the quality of these 9]

There is no scientific evidence that students with learning difficulties improve if they receive special training, but rather the opposite. Removing that student from the classroom represents an enormous loss of wealth for all the other students, Higher Education Institutions, their subsidiaries, postgraduate programs and careers. degree (Art. 82, Law No. 4995/2013). (ANEAES, 2018).[for whom the essential factor of inclusive education is that all teachers are convinced that they have a commitment and a legal obligation to the students. On the other hand, support must be guaranteed for teachers so that they have the necessary tools and/or resources to create a culture of required skills that the curriculum in the academy entails.

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