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SUMARIO SUMMARY RESUMO

Editorial

Dear Readers. We are pleased to present the December 2023 issue of the ISJ Journal, which stands out for its thematic diversity and the quality of the articles presented. This issue is composed of three valuable contributions in the field of research and two other reflections that address relevant issues in the educational field.

Sandra Milena De Hoyos Benítez, from the Antonio Lenis Educational Institution in Colombia, introduces us to the intriguing universe of the "Perception of Educational Inclusion and Communicative Barriers from the Experience of Deaf Students of Schools at Sincelejo City in Sucre, Colombia". This article, based on a qualitative and exploratory approach, dives into understanding the perception of educational inclusion by students with hearing impairments. Without manipulating variables, the research provides authentic and valuable insight from the natural context of deaf students, addressing a topic that deserves attention and understanding.

Leticia B. Camargo invites us to reflect on the complexities of education in Brazil with her article "Gestão Escolar Democrática e Qualidade Social da Educação". This paper highlights the tensions between managerialist and democratic perspectives in the country's contemporary educational policies. By highlighting the contradictions between emancipatory and inclusive discourses and governmental practices focused on accountability and market logics, the article poses crucial challenges for the effective implementation of progressive principles in the educational system.

From the International Iberoamerican University, Dulfay Beltran Escobar introduces us to the "Importance of Environmental Education to Understand Climate Change in the Basic Education of Cycle II of the Andrés Bello School". This study, with a qualitative design, presents a methodology focused on environmental education to address carbon footprint reduction in a school in Colombia. Using tools such as direct observation and anchor charts, the research assesses the impact on environmental awareness and carbon footprint reduction among cycle II students, providing valuable insights to address the challenges of climate change in the educational setting.

These articles not only offer deep insights and fresh perspectives, but also highlight the importance of addressing key issues in education today. Through their innovative methodologies and thoughtful approaches, these studies inspire the educational community to face challenges with an open and proactive mindset, thus contributing to the continuous advancement of the educational field.

From the point of view of reflection, Rocío Sanz Peinado invites us to explore active and healthy aging in her article entitled "Language Stimulation for Healthy Active Aging: Cognitive Training Program". This story highlights the increase in life expectancy worldwide and raises frailty as a crucial obstacle to aging. Alterations in key brain areas, such as Broca's and Wernicke's areas, present challenges that directly impact language processing. Within this scenario, the article reveals a cognitive training program that emerges as a beacon of hope, offering new possibilities for improving the quality of life in older adulthood.

Finally, in a narrative that defies convention, José Carlos Chía Barraza, from the Universidad Autónoma de Madrid, invites us to reconsider our perception of video games in his article "Thinking Routines in Videogames and Project-Based Learning in Secondary School". In this intriguing tale, video games cease to be simply a challenge and become a unique opportunity for learning. Through a project designed for the second year of high school, the author fuses the motivation inherent in video games with an educational context, applying thinking routines in each phase of the project. Although the COVID-19 pandemic altered the results, the narrative highlights the adaptability of the project as a valuable and revealing lesson.

This issue of the ISJ Journal reflects the richness and diversity of perspectives in the educational field, addressing crucial issues and promoting reflection and progress in educational research. We hope you enjoy reading and find inspiration in these contributions!

Editors in chief

Claudia De Barros Camargo and Antonio Hernandez Fernandez

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PERCEPTION OF EDUCATIONAL INCLUSION AND COMMUNICATIVE BARRIERS FROM THE EXPERIENCE OF DEAF STUDENTS OF SCHOOLS AT SINCELEJO CITY IN SUCRE, COLOMBIA

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Abstract. This article has as purpose of study the perception of inclusion that students with hearing disabilities have who are registered in the municipality of Sincelejo, Sucre, Colombia according to the registering system SIMAT. Having in mind the purpose of study, the type of research design is qualitative, exploratory, non-experimental. It is an exploratory study because it examines a little studied topic and looks for the comprehension of it; non-experimental because the subjects under study (deaf students) already belonged to the identified group who were inquired about the perception of inclusion in their natural context to analyze after this without manipulating variables. Because of the mentioned type of research, it was decided to design and apply data collecting techniques as interviews and LIKERT-type closed question questionnaires, as well as the literature revision related with deafness, inclusion and education in school students with hearing disability. Once collected the information, an statistic analysis was performed and the policy of inclusion was formulated with its respective actors, indicators, among others. Finally, the conclusions and respective recommendations were consolidated to implement in a successful way the inclusive education policy.

Keywords: Communicative Barrier, deaf, deafness, inclusion, perception.

PERCEPCIÓN DE INCLUSIÓN EDUCATIVA Y BARRERAS COMUNICATIVAS DESDE LA EXPERIENCIA DE LOS ESTUDIANTES HIPOACÚSICOS DE LAS INSTITUCIONES EDUCATIVAS DEL MUNICIPIO DE SINCELEJO – SUCRE, COLOMBIA

Resumen. Este artículo tiene como objeto de estudio la percepción de inclusión que tienen los estudiantes con discapacidad auditiva o hipoacusia matriculados en el municipio de Sincelejo, Sucre, Colombia, según el Sistema de Matriculas Estudiantil (SIMAT). Teniendo en cuenta el objeto de estudio, el tipo de diseño de la investigación es cualitativa, exploratoria, no experimental. Es un estudio exploratorio, porque examina un tema o problema poco estudiado y pretende aumentar la comprensión del mismo; no experimental, porque los sujetos de estudio (estudiantes hipoacúsicos) ya pertenecían a un grupo identificado, a los cuales se les indagó acerca de la percepción de inclusión en su contexto natural para después analizar su nivel de inclusión, sin llegar a manipular las variables. Por el tipo de investigación mencionado, se decidió diseñar y aplicar técnicas de recolección de datos como entrevistas y cuestionarios de preguntas cerradas tipo LIKERT, así como revisión bibliográfica relacionada con la hipoacusia, la inclusión y la educación en escolares con discapacidad auditiva. Una vez recopilada la información, se realizó un análisis estadístico y se procedió a formular la política de inclusión con sus respectivos actores, indicadores, entre otros. Finalmente, se consolidaron las conclusiones y respectivas recomendaciones para lograr implementar de manera exitosa la política de inclusión educativa.

Palabras clave: barrera comunicativa, hipoacusia, inclusión, percepción, sordos.

Introduction

In Colombia, the National Institute for the Deaf-INSOR periodically prepares statistical reports on deaf people, both at the national and municipal levels, related to education, work, health and participation. For INSOR, examining the situation of access to education for the school-age deaf population involves considering those factors that allow or hinder entry and permanence in the educational system, such as gender, age, stratum, geographic area of residence, and public or private education, among others. The indicators on which INSOR is based are consolidated from two sources of information: the Registry for the Location and Characterization of Persons with Disabilities -RLCPD- of the Ministry of Health and Social Protection, from which some features of the registered deaf population of school age will be identified; and the Student Enrollment System -SIMAT- of the Ministry of National Education, which allows establishing the educational characteristics of the deaf population enrolled.

With respect to the municipality under study, Sincelejo, in the last census conducted by DANE in 2005, 253 people with hearing limitations of school age (3-17 years) were reported, but, for the year 2015 the SIMAT reports that in the 15 educational institutions available for the attention of deaf students, 71 students with hearing limitations were enrolled. This is due to the fact that according to INSOR "*the percentage of the deaf school-age population that attends an educational institution is 70%, and the percentage that does not attend an educational institution is 30%. Therefore, 30 out of every one hundred school-age children do not attend an EI*" (INSOR, 2018). This situation arises because the *deaf person considers that, due to his condition, he/she cannot develop school activities*.

For the year 2005, in Colombia, Law 982 is published, which establishes norms tending to equalize opportunities for deaf and deaf-blind people and other provisions are issued, which is dedicated to education in Chapter III, and determines that:

> *"The National Government and territorial governments shall respect linguistic and communicative differences in educational practices, promoting quality bilingual education that responds to the needs of deaf and deaf-blind students to guarantee access, permanence and promotion of this population in*

> *formal and non-formal education, in accordance with the regulations issued for this purpose by the Ministry of National Education*."

Despite these and other legal provisions in force that seek to guarantee the right to education for deaf people, the conditions are not fully in place for those directly affected to receive quality education whenever they require it.

This article originates as a result of one of the specific objectives formulated in the thesis of the Doctorate in management and educational policy, whose object of study is the formulation of an educational policy to ensure the effective inclusion of deaf students in Colombian basic education. Thus, the experiences of educational inclusion in the different educational institutions that offer services to hearing impaired students in the municipality of Sincelejo were analyzed from the perspective of hearing impaired students, in order to determine the satisfaction of deaf students regarding the attention and services offered by the educational institutions, perceptions that allowed proposing the basic elements of an educational policy for the inclusion of hearing impaired students in elementary and secondary education in the municipality of Sincelejo - Sucre.

Method

Type of study and research design

This research is qualitative, exploratory, non-experimental. It is an exploratory study, because it examines a topic or problem that has been little studied and aims to increase the understanding of the subject; non-experimental, because the study subjects (hearing impaired students) already belonged to an identified group; these students were asked about the perception of inclusion in their natural context and then analyzed, without manipulating the variables.

Thus same, this research has a qualitative approach, given that "*the qualitative route focuses on understanding the phenomena, exploring them from the perspective of the participants in their natural environment and in relation to the context*" (Sampieri, 2018), this is how this type of approach is appropriate to analyze the perception of educational inclusion that deaf students have and the educational experiences that have been had in basic education institutions that have housed these students in their classrooms.

Similarly, the ethnographic design was used for this research. In the words of Álvarez (2008), Maturana Moreno, G. A., & Garzón Daza, C. (2015) cited by Cotán Fernández (2020):

> *"(...) in the educational field, this approach makes it possible to analyze school dynamics, as well as to learn about the diverse perspectives and cultures of the school community, its main purpose being the improvement of school practices*". Elements of action research design were also applied, since "*Its fundamental purpose is focused on providing information to guide decision-making for programs, processes and structural reforms*".

For his part, Elliot (1991) quoted by Sampieri Hernández, et. al (2010), conceptualizes action research as the study of a social situation with a view to improving the quality of action within it, which for the case of this research involves the study of the perception of educational inclusion of deaf students with the aim of improving the quality of education offered to them.

Initially, an instrument was designed to analyze the perception of inclusion to be applied to deaf students in the city of Sincelejo, a survey that was analyzed and validated by sign language interpreter teachers and speech therapists. Subsequently, the inclusion perception survey was applied to 17 high school and middle school students in the city of Sincelejo, and the experience and opinions of these students regarding how included they feel in their educational environment were analyzed, while very important conclusions were obtained to take into account when formulating the educational policy that guarantees the inclusion of the hearing-impaired population in Colombian basic education.

Similarly, exploratory focus group interviews were conducted with the staff of the schools attended by deaf students identified by the Sincelejo Municipal Secretary of Education.

Population and sample

According to Sampieri Hernández et al. (2010), the population is:

> "(...) *the set of all cases that match a set of specifications*"; while the sample "*is a subgroup of the population of interest on which data will be collected, and which has to be precisely defined or delimited beforehand, it must be representative of that population*".

For this research, a non-probabilistic sample was used, since it does not depend on chance, but on the characteristics of the students. The study population is constituted by all children and adolescents enrolled in public educational institutions, duly diagnosed before the Municipal Secretary of Education as students with deafness or hypoacusis. These students, as mentioned above, must be registered as such in the SIMAT (integrated enrollment system). The unit of analysis corresponds to students in the transition, elementary and junior high school grades in the municipality of Sincelejo, Sucre, Colombia, who are reported with a hearing disability in the Integrated Enrollment System SIMAT. At present, 51 institutions are attached to the Secretary of Education of the municipality of Sincelejo, of which 37 correspond to the official sector and 14 are non-official.

- **Intentional choice:** The study population is constituted by all children and adolescents enrolled in public educational institutions, duly diagnosed before the Municipal Secretary of Education as students with deafness or hypoacusis. These students, as mentioned above, must be registered as such in the SIMAT.
- **Stratified:** By grade level and gender.
- **Exclusion criteria**

- Students whose hearing impairment is not properly reported in SIMAT.
- Students with hearing disabilities who have not acquired reading skills or do not have an interpreter and translator to help them fill out the instrument.
- Students who have not fully completed the instrument.
- Elementary school students who, due to their age, may have difficulty in understanding the questions of the instrument.

Results

Analysis of interviews with teaching and support personnel

The following are the main results and conclusions of the research based on the interviews conducted with the staff of the schools attended by deaf students identified by the Sincelejo Municipal Secretary of Education (teachers and support staff) in order to determine their perceptions and obtain more information on the state of inclusive education of deaf students in the municipality of Sincelejo (Table 1):

Table 1

Summary of the results of the interviews conducted

SUBJECT	INTERVIEWEE 1	INTERVIEWEE 2	INTERVIEWEE 3
Permanent sign interpreter	Institution has a group of LSC interpreters in each of the grades of hearing impaired students. The interpreter's accompaniment is permanent, even during extracurricular activities.	The school has a permanent interpreter. Deaf students are taught to learn sign language.	They offer interpreter services on a permanent basis because it is their mother tongue. There is always a bilingual (interpreter) teacher in transition and elementary school and a linguistic model who is deaf. In high school there is always an interpreter, a support teacher who supports the subject and knows sign language.
Additional support provided to facilitate adaptation to the school's teaching methodology	Initially, the institution offered special education and expanded its coverage to students without difficulties. The institution had already implemented specific methodologies for each of the disabilities. LSC is recognized as the first language and written Spanish as the second language. There is no differentiation between hearing and deaf people, all are included in the implemented methodology.	The students are reinforced, supported and oriented permanently with the teachers who teach them sign language. Receive vocabularies aids in sign language word pictures.	Additional help to adapt is not necessary because the school's teaching methodology is not exclusive. The same methodology is used for deaf and hearing students. They are allowed to deliver the activities in more time, although they are very responsible in the delivery of their activities. Quantitative evaluation is accepted with less percentage. They have adapted perfectly and comply with their activities.

	Curricular adaptations are adjusted to all students in the same classroom		
Academic outcomes of deaf students	Deaf students are capable of acquiring knowledge as long as they have adequate interpretation. In eleventh grade, there are three deaf students who are in the top five places. They have a capacity for criticism, inference and reasoning. They are very fond of reading and questioning. Academic results have been good.	They have proven to be the best students. The deaf graduates of our institution are students and occupy the best positions at the University of Sucre and CECAR.	Academic results are acceptable, in some subjects such as chemistry and mathematics they have a little more difficulty.
Teaching strategies	the main strategy is service interpretation. The methodology applied must be inclusive for all types of students Common use of concept maps, mind maps, slides, constant use of textual definitions.	Each explanation should be written by the teachers on the blackboard Using the traveler's notebook Review assigned activities Allow presentations in sign language and, above all, that the interpreter be present	Graphic, visual and concrete material. Methodology that favors meaningful learning.
Learning assessment	Equal evaluations for deaf and hearing. Through written texts, the interpreter interprets for them because written Spanish is the second language. Prioritize the child's responses or interventions in his or her mother tongue.	They are made in writing with the interpreter present and translated into sign language or orally with the interpreter.	Through sign language interpreter or written assessment. It looks at the process of understanding as content is developed. The evaluation should be done on a daily basis.
Training for teachers and managers in LSC	Space has been created for workshops with basic vocabulary in sign language.	All school personnel, including parents and guardians, receive LSC training.	Yes, they are made to parents and teachers during the institutional weeks. There is still a lack of sign language comprehension.
Participation of deaf students in academic, cultural and sporting events	They are included whenever they want to participate	They participate in soccer, pedagogical days in areas such as the environment or mathematics, dances, and before the beginning of cultural events they interpret the school, departmental and municipal anthems in LSC.	They participate in all activities: cultural, sports, championships, flag-raising, painting events, science fair, olympics, etc. They belong to the association of the deaf.

			The person in charge is a deaf student.
Creation of audiovisual material	Making slides, videos, concept maps.	Use of the computer, videos of classes at LSC, use of the traveling notebook to be in constant communication with home and vice versa	Volume figures, maps, illustrations, etc.
Classroom characteristics	Good lighting Keep them away from distractions. Place them in the first positions so that there is no interference with the interpreter.	It is important for the deaf to concentrate in a peaceful, quiet classroom without distractions.	Good spaces, ample, built-in closets with material that can be handled. Very good light. Clear classroom covenants and that the teacher has group management. Conditions of respect during communication.
Challenges in working with deaf students	Their character is a little strong, but they adapt to academic groups very easily.	It is a positive challenge because we learn from them both the LSC and their thoughts, tastes, ways of learning and interacting.	The important thing is motivation.
Parental involvement in the teaching process	Parents or guardians are involved in the academic process as well as in the follow-up, trainings and meetings.	They are involved in the learning process through LSC trainings, calls or citations, constant reinforcement and support, follow-up through PIARs.	Community inclusion scheme: the patient's background, medical history and knowledge are evaluated and the degree to which he/she can be initially included is determined.
Guidelines and actions to be taken when coexistence problems arise	Problems of coexistence are solved with the presence of an interpreter.	There is no special route, it would be applied according to what happened if it is a case of type I, II or III as explained in the school coexistence law	There is always the interpreter when a problem arises. Their character is a little strong, but they adapt to the community. There are no major problems.
Awareness, education and training programs with the educational community	The entire community is invited to attend the sign language trainings that are organized on a regular basis	Training on educational inclusion, teacher training on how to deal with disability and awareness programs in case of discrimination.	Ongoing training in sign language and inclusion topics that are almost always held during institutional weeks.
Cultural and recreational events to highlight deaf culture	They are active participants in all cultural events offered to the student community.	Participate in many cultural, social, recreational and sports activities Participate with fairness, respect and good coexistence.	They participate in all the activities that are organized: cultural, sports, championships, flag raising, painting events, science fair, etc.

Source: Interviews conducted with teaching and support personnel

Results on relevant survey findings

The main results of the surveys applied to deaf students registered in the SIMAT for the Municipality of Sincelejo are presented below:

Of the 17 students who completed the instrument, about 35.29% were female students and 64.71% were male students. Of the female respondents, 83.33% stated that they were profoundly deaf and 16.67% said they were deaf and hard of hearing. On the other hand, of the male respondents, 9.09% are profoundly deaf, 54.54% are considered hearing impaired and 36.36% state that they are deaf with cochlear implants. Because of their diagnoses, some of the students use aids to improve their hearing. Of the 70.59% who state that they use hearing aids, 41.18% use only hearing aids and 29.41% have both cochlear implants and hearing aids.

Regarding knowledge of the mother tongue and Spanish, 100% consider that they know and use Colombian Sign Language (CSL). In addition to their mother tongue, 76.47% know how to read Spanish and 23.53% consider that they read little Spanish. When writing in Spanish, 47.06% consider that they write in Spanish and 52.94% state that they write little in Spanish. There are cases in which deaf students acquire the ability to lip or lip-facial reading, for the case of the respondents, 29.41% consider that they have this ability quite developed, 41.18% have this ability little developed, while 29.41% definitely do not have it.

Regarding the forms of communication with their hearing-impaired peers, 76.47% communicate exclusively with LSC, only 11.76% put LSC and oral language into practice and the same proportion (11.76%) resort to a sign interpreter. In contrast, when communicating with their hearing peers, 11.76% communicate exclusively orally, 29.41% use LSC exclusively, 17.64% combine LSC and oral language, while 41.17% use a sign interpreter as an intermediary in communication.

Due to the obvious communication barriers between hearing impaired and hearing people, and given the impossibility of having an interpreter to support them in their communication processes at all times of their lives, most of these people have relied heavily on the use of technological tools that, although they do not completely close the communication gap, become a great support when it comes to understanding and making themselves understood in society. With the globalization of the smartphone, social media, chat and video calling applications over the past two decades, there are many hearing-impaired people who use Text Messaging (SMS), WhatsApp, video calling, Facebook, Messenger and the relay center to communicate. 100% of the students interviewed stated that they use at least video calls or a combination of video calls and other networks and tools to improve their communication experience with other people (deaf or hearing) and to be included in society.

Regarding the level of understanding of what their hearing peers transmit when communicating with hearing impaired students, 70.58% of the respondents stated that there are no problems in understanding them. To be more specific, to the statement "*I understand what my fellow listeners want to tell me when I communicate with him/her*", 58.82% agree and 11.76% strongly agree. However, there are 29.41% who totally disagree with this statement. In contrast, to the statement "*I perceive that my fellow*

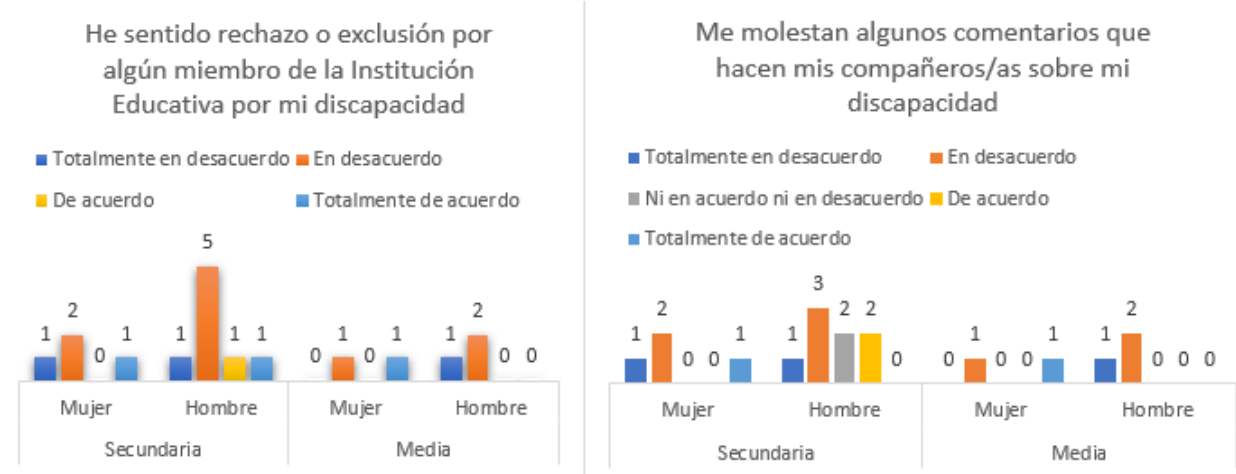
listeners understand when I communicate with them", 29.41% totally disagreed; 11.76% disagreed; 11.76% stated that they neither agreed nor disagreed; 29.41% agreed; and only 17.54% totally agreed. The above shows that at least 41.17% of hearing-impaired students consider that there are comprehension problems when hearing people communicate with them.

When a person with a disability lives in an environment in which he or she feels like a minority, there is a possibility that at some point in his or her life he or she has felt excluded or rejected. In the case of the hearing-impaired students who were interviewed, 17.64% disagreed with the statement "*I have felt rejection or exclusion by some member of the educational institution because of my disability*"; 5.88% agreed and 17.64% totally agreed. The above shows that at least 23.52% of students with hearing impairment have at some point felt rejected or excluded in their school environment (See Figure 1).

On the other hand, there is also the possibility that at some point, a member of the educational community may have made a comment that was not well received by the deaf student, therefore, to the statement "*Some comments made by my classmates about my disability bother me*", 17.64% disagreed; 47.05% disagreed; 11.76% disagreed or disagreed; 11.76% agreed; and 11.76% felt totally identified. (See Figure 1)

Figure 1

Perception of rejection or exclusion in their school environment. Source: Inclusion perception survey applied to deaf students

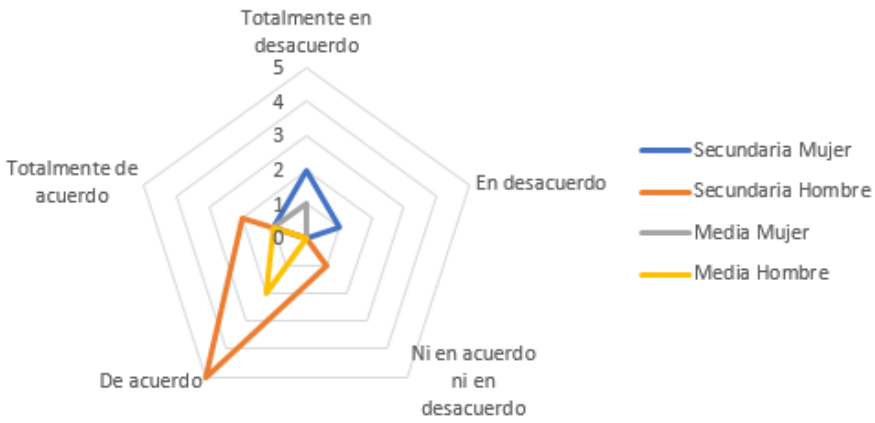


Regarding the perception of support and acceptance of their disabilities by their teachers, to some extent 70.58% of the surveyed students believe that their teachers understand their hearing impairments. Being specific, to the statement "*I feel that my teachers do not fully understand my hearing impairments*", 17.64% strongly disagreed; 52.94% disagreed; 17.64% neither agreed nor disagreed; only 11.76% strongly agreed. In the same sense, 41.17% of the respondents feel completely satisfied with the treatment, support and attention I receive from teachers; 41.17% feel satisfied and 17.64% feel completely dissatisfied with the treatment of their teachers.

Continuing with the line of satisfaction and perception of inclusion taking into account the teaching practice and their daily experiences in the classroom, 70.58% of the students consider that their teachers are clear in the explanations of school subjects (29.41% totally agree and 41.17% agree); 23.52% disagree with the way their teachers transmit the explanations of the topics (17.64% totally disagree and 5.88% disagree) and; 5.88% have a neutral position (neither agree nor disagree). (See Figure 2)

Figure 2

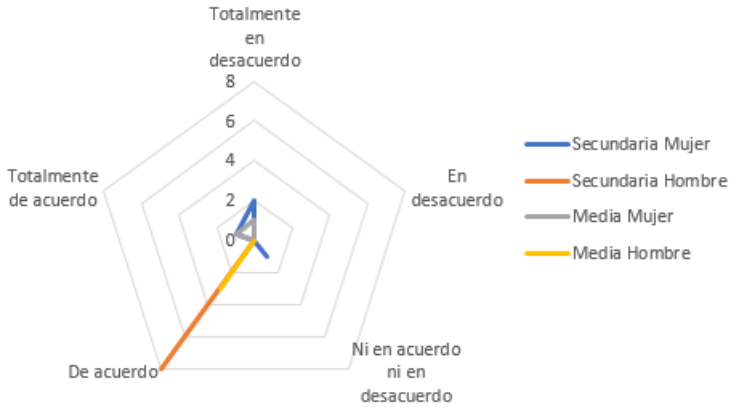
Teachers are clear in their explanations of school subjects. Source: Inclusion perception survey applied to deaf students



When asked if the classroom offers adequate means and conditions for their hearing needs, 76.47% of the students consider that the means and conditions are adequate (11.76% totally agree and 64.70% agree); 17.64% totally disagree; and 5.88% have a neutral position (neither agree nor disagree). (See Figure 3)

Figure 3

Means and conditions appropriate to your hearing needs. Source: Inclusion perception survey applied to deaf students



When asked whether teachers offer subject contents adapted to their hearing impairment, 64.70% consider that the contents offered are in accordance with their condition (11.76% totally agree and 52.94% agree); 29.41% completely disagree with the contents offered taking into account their condition; and 5.88% neither agree nor disagree.

On the other hand, it is well known that deaf people are able to reprogram the areas of their brain assigned to hearing to improve their vision, in that sense, it is advisable to take advantage of the sense of sight of students to improve the understanding and apprehension of the contents that are developed in the classroom. When students were asked about the visual strategies that their teachers apply in the classroom, the results were the following: according to the students surveyed, at the time of presenting audiovisual material in the classroom, there are weaknesses since subtitles are not always provided for better understanding. 52.94% said that subtitles are not always offered to audiovisual material (23.52% totally disagreed and 29.41% disagreed); 29.41% completely agreed that subtitles are always offered; 11.76% agreed; and 5.88% neither agreed nor disagreed.

Similarly, in response to the statement "*My teachers use graphs, drawings and graphic organizers for the information they want to present in the classroom*", opinions are divided: 23.52% totally disagree; 11.76% agree; 29.41% totally agree; and finally, 35.29% have a neutral position (neither agree nor disagree). Regarding the promotion of teacher-student eye contact in the classroom, 23.59% of the respondents strongly denied that their teachers promote eye contact or locate their body in front of them when they talk to them; while 76.47% affirm that their teachers do promote eye contact (41.17% agree and 35.29% strongly agree)

Although exploiting the visual part of the students is a good strategy for them to understand the content, having a classroom with too much ambience can cause deaf students to become visually saturated and lose focus. In response to the statement "*in my classroom, I avoid excessive classroom decoration in order not to visually saturate my space and favor my concentration*", 29.41% of the respondents stated that their classrooms are visually saturated (totally disagree); 23.52% agreed; 11.76% opted for totally agreeing; and 35.29% had a neutral position (neither agreeing nor disagreeing)

In addition to promoting eye contact, avoiding excessive classroom ambience and using graphic and audiovisual material to support classroom activities with hearing impaired students, it is very important to implement didactic strategies in the teaching process and in the evaluation process, in this aspect, the results of the survey are quite positive. In response to the statement "*The teachers at my educational institution make use of didactic strategies in the **teaching-learning process** in accordance with my abilities, learning styles and rhythms*", 58.82% agreed and 17.64% expressed total agreement; only 23.52% expressed total disagreement

Likewise, for the statement "*Teachers at my educational institution make use of didactic strategies in the **evaluation process** according to my abilities, learning styles and rhythms*", 64.70% agreed and 11.76% totally agreed; 17.64% of the respondents

totally disagreed and only one student (5.88%) showed a neutral position (neither agreeing nor disagreeing)

In Sincelejo, there are no educational institutions exclusively for people with disabilities; the municipality guarantees educational services for these students in regular educational institutions. Therefore, institutions that host deaf students should include Colombian Sign Language (CSL) interpreters in this service, so that communication barriers between deaf and hearing students can be reduced and students can better understand their hearing teachers and administrators. In relation to the above, the students interviewed were asked about their personal need to use an interpreter or linguistic model. When asked the question, 82.35% of the students confirm that they do require an interpreter to understand their teachers (41.17% agree and 41.17% totally agree), only 11.76% state that they do not require an interpreter and 5.88% neither agree nor disagree. Now, having the need for an interpreter does not mean that students have an interpreter in their institutions whenever they require it, that is, permanently in their institutions, in that sense, to the statement "*My school offers me the service of a sign interpreter* ***permanently***", 17.64% strongly disagreed; another 17.64% disagreed; 47.05% agreed; and 11.76% strongly agreed; finally, the percentage of students with a neutral position, that is, neither agreeing nor disagreeing, is 5.88%. We also inquired whether the educational institution offers sign language interpreter services for academic, sports and cultural events. In response to this statement, 17.64% strongly agreed; 58.82% agreed; 17.64% strongly disagreed; and 5.88% neither agreed nor disagreed.

So far, it has become evident that not all students have the possibility of having a sign language interpreter on a permanent basis, therefore, it is very helpful for teachers and administrators to know and use the LSC, however, the results were as follows:

64.70% of the respondents deny that their teachers know and use the LSC in the classroom (23.52% totally disagree and 41.17% disagree); on the contrary, in equal proportions, 11.76% adopt a totally agree, agree or neutral position (neither agree nor disagree). (See Figure 4

Teachers know and use sign language in the classroom. Source: Inclusion perception survey applied to deaf students

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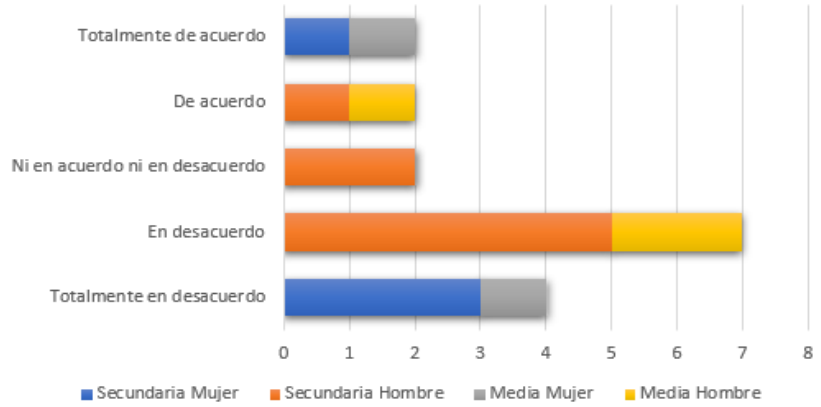
Figure 4

Teachers know and use sign language in the classroom. Source: Inclusion perception survey applied to deaf students



In relation to the managers and the knowledge and use of CSL in the institution, they were presented with the statement "*The managers of my school know and use sign language*", here the panorama is a little more favorable in the sense that 35.29% were in total agreement and 11.76% agreed; however, 47.05% disagreed and the remaining 5.88% totally disagreed.

With respect to whether their peers (fellow students) know and use sign language, the results were as follows: 11.76% of the respondents considered that they totally agreed; 11.76% agreed; 35.29% disagreed; 23.52% of the respondents totally disagreed and finally, 17.64% adopted a neutral position (neither agree nor disagree) (see Figure 5

Peers know and use sign language in the classroom. Source: Inclusion perception survey applied to deaf students

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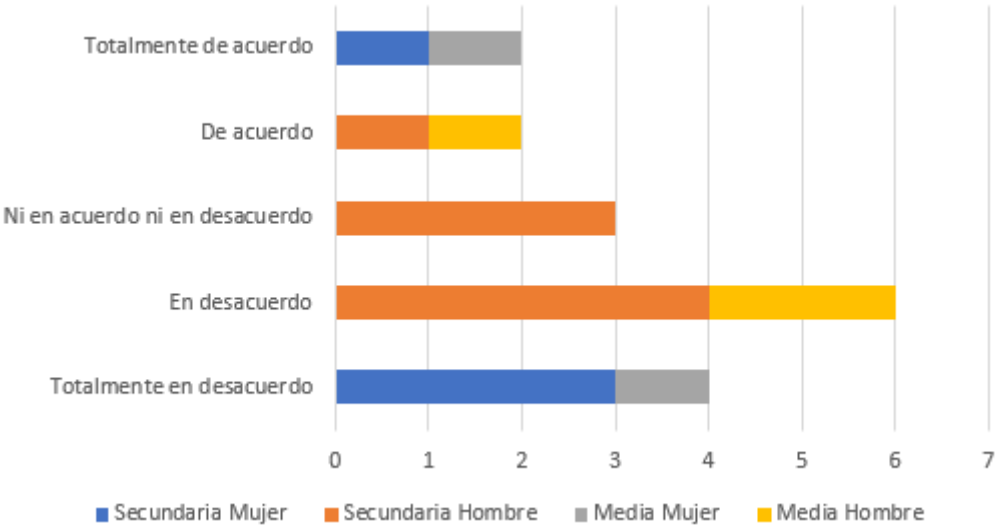
Figure 5

Peers know and use sign language in the classroom. Source: Inclusion perception survey applied to deaf students

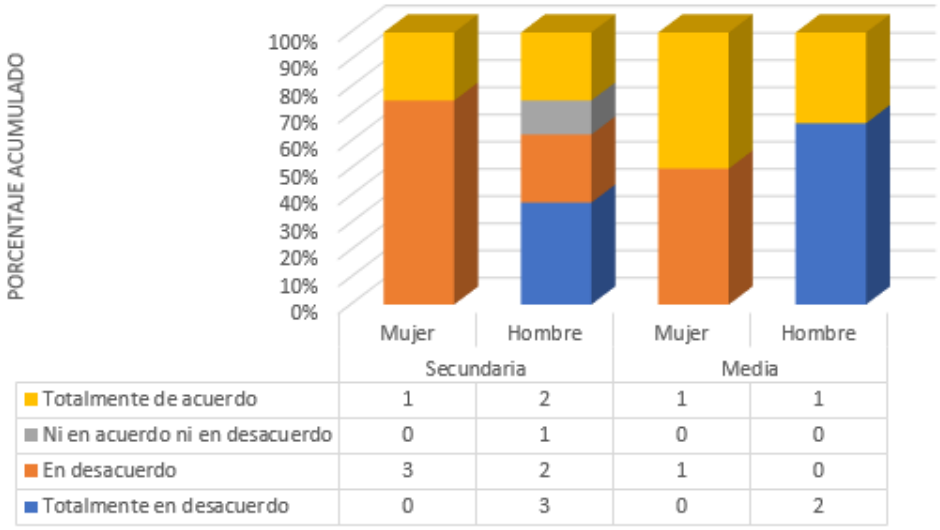


Although teachers, through their pedagogical practices in the classroom, can promote a better understanding and apprehension of content, it is well known that education professionals cannot act as a loose cannon and must follow institutional guidelines on inclusion. Taking this reality into account, when faced with the statement "*The institution adapts the teaching methodology to my hearing impairment*", the results were as follows: 17.64% disagreed completely; 52.94% agreed; 23.52% adopted a position of complete agreement and 5.88% neither agreed nor disagreed.

As a complement to the previous question, 29.41% of the students surveyed totally agree that the teaching methodology of the Educational Institution generates barriers in the teaching-learning process; 35.29% consider that the methodology does not generate barriers (denies the statement); 29.41% categorically deny that the teaching methodology of the institution generates barriers; finally, 5.88% adopted a neutral position (neither in agreement nor in disagreement) (see Figure 6)

Figure 6

The teaching methodology of the Educational Institution generates barriers in the teaching-learning process. Source: Inclusion perception survey applied to deaf students



Discussion and conclusions

Once the instrument for characterizing the hearing-impaired population was applied, it was determined that the hearing impaired students who identified themselves as female represent only 35.3% of the hearing impaired population. This information could also be a starting point for analyzing the problems of the deaf population from a gender perspective, since deaf women can be useful indicators for measuring the gender equity indexes of this population. In relation to the above, INSOR (2011) warned that, according to society, the main role of deaf women is as caregivers and dedicated to family life, which could be a cause of the low percentage of deaf female students compared to their male peers.

The characterization of the deaf students showed that 76.5% know how to read Spanish, but only 47.1% know how to write it. In this sense, it is possible to identify an

aspect of language teaching that should be analyzed and compared with the models applied in other countries; for example, the Swedish school model for deaf people can be taken as a reference, which states that after ten years of schooling, students should be bilingual. The reason for this model of bilingualism is that the second language is necessary for the deaf because sign language does not have a writing system and, in order to function properly in society, the deaf are obliged to use written language as the only means of access to information and exchange with hearing people in the society in which they live. That is why, although it is considered that the mother tongue of people born with hearing impairment is sign language, educational institutions and families should not neglect the importance of teaching the Spanish language.

On the other hand, the technological progress to which we have access nowadays, means an accumulation of tools that are at the hand of deaf people to mitigate a little the communicative barriers that may arise. Thus, the characterization of deaf students made it possible to identify the use they make of technological tools when communicating with their teachers and with other deaf and hearing students. It was then determined that they all resort to the use of technological tools such as video calls, WhatsApp, e-mail, Messenger, Facebook and relay center, which leads to recognize the role that these technological tools have played during the covid-19 pandemic to be able to ensure the continuity of the teaching process in deaf schoolchildren.

The characterization of the deaf students revealed that 41.2% of the respondents identified themselves as deaf with hearing loss and 23.5% as deaf with cochlear implants (for a total of 64.7%). In that order of ideas, 70.6% stated that they use some type of aid (hearing aid or implant) to improve their hearing, a percentage that places them well above the statistics published by the WHO (2021) where it states that only 17% of all people who could benefit from using a hearing aid wear one.

When analyzing the experiences of educational inclusion in the different educational institutions of Sincelejo from the perspective of the deaf and hard of hearing students surveyed, it was found that an educational inclusion policy specifically for the deaf population is required, since, although there is an inclusion law in Colombia, this law covers in general terms the population with disabilities, but does not address the specific needs of students with this condition. Therefore, when analyzing the perspective of inclusion of hearing-impaired students, we found aspects that could be improved to guarantee the right to quality education and improve the school environment for this population.

In relation to the above, an educational policy proposal to ensure the inclusion of deaf students should contain actions and recommendations for teachers to develop their work based on the following pedagogical practices: make use of didactic strategies according to the abilities, styles and learning rhythms of deaf students both in the teaching process and in the evaluation process; learn and use sign language in the classroom; offer the contents of the subjects adapted to the conditions of deaf students; always offer audiovisual material with subtitles to improve the understanding of the contents; always use drawings and graphic organizers to offer new knowledge; promote eye contact and always communicate face to face with deaf students in order to have the opportunity for

a possible lip-facial reading; fully comply with the individual plan of reasonable accommodations that must be designed and implemented; among others. Likewise, although educational institutions offer the service of a linguistic model or sign language interpreter, not all the pedagogical responsibility can be left to these people who are considered a support for the teaching process that is in charge of the regular teacher.

On the other hand, the responsibility for inclusive education cannot rest solely with classroom teachers and the linguistic models or interpreters that support them. It is required that, from the management, academic, welfare and coexistence management, actions are implemented to help improve the academic conditions of deaf people. In that order of ideas, it was identified that the inclusive education policy to be proposed should include institutional aspects such as: awareness campaigns, dissemination and respect for deaf culture; offer the service of a linguistic model or sign language interpreter not only within the classroom but also in the various academic, cultural and sporting events; specify in the coexistence agreement the routes and actions to be taken in situations involving students with hearing impairment; organize awareness programs, education and training on issues related to the integral development of students with hearing impairment; organize cultural and recreational meetings with families and the community in general to recognize the values and culture of the deaf community; follow up on graduates with hearing impairment to identify the impact of their education to develop in society; allocate resources exclusively for the acquisition of bibliographic copies, technological tools and other resources to support the educational process of deaf students; among others.

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DEMOCRATIC SCHOOL MANAGEMENT AND THE SOCIAL QUALITY OF EDUCATION

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Abstract. This article examines the tensions between managerialist and democratic perspectives in contemporary Brazilian education policies, highlighting contradictions between discourse and practice. Although guiding documents such as the LDB and PNE convey emancipatory and inclusive ideals for education, government programs have emphasized accountability, quantitative results and market logics. At the same time, austerity measures such as EC 95 strangle in practice any possibility of implementing the progressive principles laid down in the legislation. This tension reveals broader disputes in the political arena, with sectors committed to the commercialization of education historically confronting the struggles for a public, free and quality school for all. There is an urgent need to reinvent the role of the state beyond regulation, reclaiming its leading role as provider and maintainer of the material conditions for the realization of the right to education. This reinvention involves collective mobilization to build educational processes that are contextualized, emancipatory and opposed to curricular lightening. It requires democratically run schools, with popular participation in pedagogical decisions and the use of resources. This demands an educational policy that is faithful to the interests of the majority, overcoming the privatist and managerialist agenda that undermines its democratizing potential. The universalization of quality standards as a right demands this reinvented public school, ethically committed to our people.

Keywords: State, neoliberalism, quality, education, school management.

GESTÃO ESCOLAR DEMOCRÁTICA E QUALIDADE SOCIAL DA EDUCAÇÃO

Resumen. O presente artigo examina as tensões entre perspectivas gerencialistas e democráticas nas políticas educacionais brasileiras contemporâneas, evidenciando contradições entre discursos e práticas. Embora documentos orientadores como LDB e PNE veiculem ideais emancipatórios e inclusivos para a educação, programas governamentais têm enfatizado accountability, resultados quantitativos e lógicas de mercado. Concomitantemente, medidas de austeridade como a EC 95 estrangulam na prática qualquer possibilidade de efetivação dos princípios progressistas previstos na legislação. Esse tensionamento revela disputas mais amplas na arena política, com setores comprometidos com a mercantilização do ensino confrontando historicamente as lutas por uma escola pública, gratuita e de qualidade para todos. Urge reinventar o papel do Estado para além da regulação, resgatando seu protagonismo como provedor e mantenedor de condições materiais à efetivação do direito à educação.Tal reinvenção passa pela mobilização coletiva pela construção de processos educativos contextualizados, emancipadores e contrários ao aligeiramento curricular. Requer escolas geridas democraticamente, com participação popular nas decisões pedagógicas e uso dos recursos. Reivindica-se assim uma política educacional fiel aos interesses das maiorias, superando a agenda privatista e gerencialista que solapa seus potenciais democratizantes. A universalização do padrão de qualidade como direito demanda essa escola pública reinventada e comprometida ethicamente com nossa gente.

Palabras clave: Estado, neoliberalismo, qualidade, educação, gestão escolar.

Introduction

The relationship between the state, educational policies and the quality of education has been exhaustively debated by various educational thinkers and scholars in contemporary times, gaining even more centrality in recent years (Azevedo, 2017; Silva, 2020; Santos, 2021; Vieira, 2022). According to Azevedo (2017), the state plays a crucial role in the realization of the human and social right to education, and is responsible for universalizing educational access through the financing and public provision of education systems. In addition to regulating parameters and guidelines for education policy, the state is also responsible for implementing this policy in order to guarantee educational opportunities for all, especially for historically excluded groups, seeking equity and social justice (Silva, 2020).

As analyzed by Santos (2021), the realization of the right to education and the provision of quality education are intrinsically related to the capacity of states to formulate and implement consistent and well-funded public education policies. In this sense, it is the primary role of governments to secure the budgetary resources necessary to fund plans, programs and actions that promote tangible improvements in the quality of learning and leverage equity in the field of education.

However, according to Vieira (2022), there are historical and structural challenges that hinder the universalization of free, inclusive and transformative public education in Brazil. Educational and social inequalities are still profound, with significant impacts on the learning outcomes of the majority of Brazilian students. This is because state investment in education is less than ideal for a country with the continental dimensions and socio-economic contrasts of Brazil. Therefore, increasing funding for education and formulating consistent policies for valuing and

teacher training are indispensable steps to boost the quality of public education in the long term.

Thus, in this author's view, a social quality education can only be achieved when the state assumes its responsibilities to expand school attendance, eliminate barriers to access and permanence and provide adequate and inclusive material and pedagogical conditions so that all students develop their full potential, from an emancipatory education perspective. Therefore, guaranteeing the right to education involves both the regulatory and funding role of the state, as well as its executive role in implementing universalist education policies aimed at equity and social justice.

However, in contrast to this vision of the state as provider and executor of inclusive education policies, in recent decades we have witnessed the advance of neoliberal reforms that have reconfigured its role in the field of education. As examined by critical thinkers such as Gentili (2020), Peroni (2020), Apple (2017), Ball (2014), Lipman (2011) and Torres (2013), these reforms have reduced the role of the state to the regulation, evaluation and control of education systems, transferring the actual execution of educational processes to private initiative or local management bodies.

According to Apple (2017), these reforms represent a political and economic agenda aimed at shrinking the state and opening up new niches for the accumulation of capital in the field of education. Ball (2014) complements this view by highlighting how principles and practices from the business sector have colonized public education systems, redesigning processes, relationships and subjectivities in school contexts.

In line with this, Lipman (2011) and Torres (2013) analyze how these neoliberal policies have been redesigning public school networks and reconfiguring relations between the state, the market and civil society in recent years. A managerialist logic is promoted, based on economic rationality, accountability and the pursuit of profitability, which undermines the redistributive and equalizing purposes of educational policies, historically linked to ideals of social justice and human rights.

Therefore, given the rise of these reforms, the authors highlight the importance of understanding their concrete impacts on teaching-learning processes, teacher work, the curriculum and school assessment, as well as educational inequalities. In view of these effects, it is necessary to strengthen the political and social struggles in defense of quality public education for all.

Under the managerialist logic, which treats education as a non-exclusive state service, governments have taken on an evaluative character, outlining policies and parameters to be met by non-state or private public education providers (Apple, 2006; Ball, 2014; Dale, 2004; Robertson, 2012; Shoen & Fusarelli, 2008). This trend represents not only a diminishing of the state, but also the emptying of its public and social commitment to the integral development of students and the reduction of the deep educational inequalities that exist, in favor of economic and mercantile interests.

According to Apple (2006), the adoption of managerialist policies in education opens up space for economic groups to profit from the commodification of education, redesigning curricula, assessment processes and teacher training according to their interests. Ball (2014) complements this view, highlighting how educational accountability serves to control and shape teachers' work, undermining their professional autonomy.

For Dale (2004) and Robertson (2012), this managerialist logic promotes competitiveness between schools and education networks, as well as encouraging their management by measurable results, which is not always consistent with meaningful and inclusive training processes. Shoen and Fusarelli (2008) also analyze how these policies weaken the state's commitment to public, secular and quality education for all.

It is therefore necessary to problematize the impacts of these managerialist reforms on education systems and to strengthen the social movements that are fighting for an emancipatory, critical, democratic and socially referenced education. It is the role of civil society to demand and defend a state committed to the public good of education.

In this scenario of transferring state responsibility to other entities in civil society or the market, the criticism of intellectuals such as Gentili, Peroni, McLaren (2005), Siniscalco (2002), Tommasi (2007), Shiroma (2011) and Libâneo (2012) falls precisely on the loss of the ideology of free, democratic and quality education for the emancipation of individuals, in favor of a managerialist logic focused on results and earning profits in educational provision.

According to McLaren (2005), the advance of global capitalism and neoliberal policies is redesigning the purposes of schooling, transforming it into yet another niche for private accumulation to the detriment of its historical role of forming critical subjects. Along the same lines, Siniscalco (2002) and Tommasi (2007) analyze how the commercialization of education undermines the commitment of states to public funding of education, especially in peripheral countries.

Shiroma (2011) and Libâneo (2012) also highlight the risks of uncritically adopting managerialist policies in public education systems, which undermine professional autonomy, the role of educators and school-community links in favor of vertical accountability and quantifiable results. In this way, the process of commercialization and privatization that is currently underway is making a mockery of the state's historical commitment to a publicly funded project of comprehensive and transformative education.

Therefore, it is the fundamental role of social movements and teachers' unions to strengthen the struggles in defense of quality, free, secular and socially referenced public education. What is required is a return to the commitment of national states to financing and materializing the right to education.

From this perspective, the very concept of educational quality takes on different contours in the light of different political-pedagogical projects. On the one hand, as part of the neoliberal reforms, the business paradigm of Total Quality in education is gaining strength, originally addressed by authors such as Ramos (1992) and Bonamino (2002),

Oliveira and Araujo (2005), Sordi and Ludke (2009) and Aguiar (2001) and widely disseminated in recent decades.

From this managerialist perspective, priority is given to measurable results, the efficiency of educational processes and products and the effectiveness of schooling in preparing individuals for the productive market, as analyzed by Oliveira and Araujo (2005). Bonamino (2002) also highlights how this paradigm emphasizes external evaluation processes and the ranking of schools and education networks based on their performance in standardized exams, strengthening a culture of performativity and accountability in education systems.

In contrast, Sordi and Ludke (2009) and Aguiar (2001) emphasize the need for alternative benchmarks of educational quality, committed to integral human formation, emancipation and social inclusion. They therefore advocate a concept of socially referenced quality, which takes into account the singularities of school contexts, the concrete conditions of teaching and learning and the collective projects of the communities served by public schools.

Therefore, at the heart of contemporary debates on educational policies are different notions of quality and the role of the state, which express conflicting interests about the purposes of school education in society. It is up to civil society to actively participate in these disputes in favor of a public, democratic and social quality education system for all.

In contrast, a critical strand, represented by scholars such as Gentili (2020), Demo (2018), Saviani (2011), Frigotto (2010), Shiroma (2007), Paro (2016) and Libâneo (2012), contrasts this approach with a vision of social quality that is linked to democratic ideals of human emancipation.

This perspective relates quality to the effective participation of the community in school management, to the integral formation of the subject for the exercise of full citizenship and to the equalizing function of education in combating the historical educational and social inequalities that still exist in our environment, as analyzed by Saviani (2011) and Shiroma (2007).

In addition, Frigotto (2010) and Libâneo (2012) emphasize the importance of conceiving the quality of education in a multidimensional way, encompassing not only the academic performance of students, but also the material conditions of schools, the training and appreciation of teachers and the political-pedagogical project undertaken by school communities.

Paro (2016) complements this approach by pointing out that quality must be defined within schools and their actors, in a democratic and participatory way, and not simply imposed from above by homogenizing policies. This emphasizes a vision of negotiated quality that takes into account the desires, demands and worldviews of the communities served by educational institutions.

Therefore, in the midst of contemporary political-ideological clashes, different notions of educational quality reflect societal projects and conceptions of the role of education in society that are often antagonistic. It is up to educators

and social movements to strengthen a critical and transformative perspective in debates on public education policies.

Therefore, while the Total Quality approach prioritizes quantitative results and preparation for subordinate work, a social quality approach focuses on the multidimensional development of students, overcoming barriers to access and permanence in school and training critical and participating subjects, committed to the democratization of Brazilian society (Gentili, 2020; Saviani, 2011; Shiroma, 2011; Paro, 2016; Sordi & Ludke, 2009).

This tension between market logic and critical-emancipatory perspectives runs through the contemporary debate on the quality of public education in times of an evaluating state and the redefinition of its role in relation to the community (Peroni, 2015; Oliveira & Duarte, 2011; Liberali, 2013).

According to Peroni (2015), the advance of managerialism in public education has strengthened a productivist and merely technical notion of quality, more in line with market interests than with the popular majority's desire for a humanist, inclusive and transformative education.

Oliveira and Duarte (2011) complement this view, highlighting the disputes between these different conceptions of quality in the educational programs and policies implemented in Brazil in recent decades. Liberali (2013) also analyzes these tensions, highlighting the need to consolidate critical quality benchmarks in public systems, committed to the social and emancipatory function of school education.

Therefore, at the heart of contemporary debates on the quality of education, there are opposing political-pedagogical projects and visions of society. It is up to educators and researchers in the field to analytically strengthen this critical perspective, identifying the pitfalls of managerialism and reaffirming social quality education as a right for all.

Given this context of disputes over quality and the role of the state in education, this article aims to examine some of the contradictions present in the actions of the capitalist state and their impact on the realization of universalist and emancipatory educational policies, as defended by Pinto (2014), Shiroma (2011), Gentili (1996), Arelaro (2005), Frigotto (2005) and Oliveira (2018).

According to Gentili (1996), the capitalist state is crossed by antagonistic class interests that condition and limit its equalizing and redistributive potential through social policies such as education. Arelaro (2005) and Frigotto (2005) share this view, highlighting the tensions between the bourgeois nature of the state and the idea of an integral, omnilateral and polytechnic education advocated by the struggles of progressive educators and social movements.

In addition, Oliveira (2018) analyzes how the advance of the neoliberal project and the managerialist agenda in recent decades has undermined the commitment of Latin American states, including Brazil, to financing public education and universalist policies capable of tackling historical educational inequalities.

In this sense, this article aims to critically reflect on these dilemmas and contradictions that permeate state action in education, seeking elements to strengthen political and social struggles in defense of public education systems of social quality, secular and truly inclusive and emancipatory.

Based on critical references of educational policy, such as the works of Oliveira (2018), Freitas (2018), Shiroma (2007), Peroni (2003), Souza e Silva (2015) and Gentili (1995), this text seeks to analyze how the advance of a neoliberal agenda limits the commitment of the state to providing free, public and quality education for all.

We are discussing a social quality based on the ideals of omnilateral education and the development of subjects' potential, in line with the reflections of thinkers such as Saviani (2013), Frigotto (2017), Ciavatta (2005) and Ramos (2010),
Paro (2007) and Arroyo (2014).

As analyzed by Shiroma (2007) and Peroni (2003), the state has relegated its role as financier and maintainer of public education systems in favor of transferring responsibilities to private initiative and local government spheres. This agenda undermines the ideals of the historical struggles for free, quality comprehensive education for workers, as Souza and Silva (2015) point out.

Therefore, based on this theoretical-critical framework, this article aims to examine some of these contradictions that permeate the actions of the capitalist state in the field of education, seeking to contribute to the public debate and to the social struggles for an education of social quality and committed to human emancipation.

The aim is to strengthen the contemporary debate on the role of the capitalist state and the disputes surrounding public education, tensioning managerialist and market-based visions in favor of defending education as an inalienable human right and as a space for the critical and emancipatory training of Brazilian students (SAVIANI, 2011; PARO, 2016; SHIROMA, 2011).

The defense of this perspective of social quality, as opposed to the movements to focus and lighten education for the market, is in line with the ideals of several current critical researchers committed to a public school that is truly committed to the popular masses and their aspirations, such as Ciavatta (2005), Frigotto (2017), Oliveira (2003), Arroyo (2014) and Libâneo (2012).

As analyzed by Ciavatta (2005), the construction of public comprehensive education systems of social quality implies an omnilateral education for students, aimed at the full development of their physical, cognitive, cultural, socio-emotional and ethical-political potential. Frigotto (2017) and Oliveira (2003) corroborate this understanding, defending the rescue of the polytechnic, unitary and revolutionary education advocated by socialist ideals.

In line with this, Arroyo (2014) and Libâneo (2012) emphasize the need for these struggles for comprehensive education to be guided by the interests and concrete demands of the working classes, in order to enhance their critical participation and leading role in defining the direction of educational policy and management, in schools and education networks, and in the development of a new education system

in the very movements to build public education systems that are truly inclusive and socially referenced.

The discussions presented in this article (table 1) have gained even more prominence in recent academic and political debates, amidst movements to cut public education funding. Researchers such as Pinto (2022), Peroni (2023), Oliveira (2021), Poli (2020), Leher (2020) and Gentili (2022) have examined the harmful effects of Constitutional Amendment 95, which froze public spending, including on education, for 20 years.

In the view of these authors, this measure intensifies the dismantling of the state's commitment to educational provision, increasing inequalities in access to a public, secular and social quality school for all, as analyzed by Oliveira (2021), Poli (2020) and Leher (2020).

Furthermore, Gentili (2022) points out that this amendment represents a facet of the neoliberal project to shrink the state and subordinate the educational agenda to the dictates of the market. In line with this, the other authors emphasize the urgency of derogating from this fiscal ceiling that jeopardizes the financing of public education at all levels, from basic education to postgraduate studies.

Therefore, in the midst of contemporary political-ideological clashes, this article aims to add to academic and social efforts to problematize current regressive educational policies, defending the strengthening of struggles for constitutionally guaranteed public education systems that are adequately funded by the state.

Other works, such as Shiroma and Evangelista's (2022), analyze the implications of the high school reform underway, stressing the priority given to vocational education to the detriment of omnilateral training. The authors denounce the lightening of the curriculum and the focus on private interests and the productive market, which is out of step with a perspective of polytechnic or comprehensive education for students.

Corroborating this critical view, scholars such as Frigotto (2017), Ciavatta (2020), Ramos (2022), Arroyo (2021) and Machado (2022) have also examined the impacts of this reform from a historical-critical perspective and in defense of polytechnic or integral education. These authors problematize the focused, light and market-oriented nature of this restructuring, which encourages watertight training itineraries linked to short-term economic demands, to the detriment of broad, omnilateral training.

Thus, in the wake of Shiroma and Evangelista (2022), this article aims to add to this contemporary debate, putting pressure on current regressive educational policies and defending the construction of public systems of comprehensive education and social quality, as advocated historically and theoretically by the progressive critical strand of Brazilian Pedagogy.

Recent research by Oliveira (2023), in the field of the sociology of education, also investigates the impacts of the Common National Curriculum Base (BNCC) on the students

curricula and teacher performance, indicating limits to school autonomy and the regional contextualization of learning. These studies reinforce the criticism of the regulatory and controlling character assumed by the state, in line with a managerialist rationality.

Other authors, such as Shiroma (2022), Evangelista (2022), Peroni (2021), Freitas (2021) and Saviani (2022) have also critically analyzed the effects of measures such as the BNCC and other recent curricular policies on teaching work and the management of education systems. These studies denounce the emphasis on measurable results, the plastering of pedagogical work and the pressure for accountability in line with the dictates of the market.

Thus, in the wake of these critical references, this article aims to examine some of the contradictions that permeate these current educational policies, especially in the context of the implementation of managerialist reforms that reinforce the regulatory and supervisory nature of the state. Dialoguing with the aforementioned studies, the aim is to subsidize the contemporary public debate, stressing the shrinkage of the state as a provider and executor of universalist policies in the field of education.

Finally, works such as those organized in the collection by Frigotto and Ciavatta (2022), as well as studies by Paro (2020), Aguiar (2021), Arroyo (2022) and Oliveira (2023) analyze counter-hegemonic experiences of reinventing the public school committed to popular interests.

These initiatives point to possibilities and ways of confronting the privatist and market-driven project that has advanced in contemporary Brazilian education, as examined by Paro (2020) and Aguiar (2021) in their studies on the democratic management of education.

In addition, Arroyo (2022) and Oliveira (2023) investigate alternative pedagogical practices built in socio-community movements or even within some public education networks, which seek to resignify the curriculum and educational processes in a counter-hegemonic way to official policies.

Thus, from the perspective of initiatives such as those investigated by these authors, this article aims to add to the theoretical and practical efforts to reinvent the public school and educational policies committed to the interests of the working classes, as opposed to the current privatist and focalizing tendencies.

Table 1

Main ideas

Authors	Works	Central Ideas
Pinto (2022); Peroni (2023)	Recent research	- Effects of EC 95 on financing and dismantling public education - Increasing educational inequalities

Authors	Works	Central Ideas
Shiroma; Evangelista (2022)	Study on high school reform	- Criticism of the prioritization of education professional - Curriculum lightening out of step with comprehensive education project
Oliveira (2023)	Research on the BNCC	- Limits to school autonomy and contextualization of the curriculum - The controlling and regulatory nature of the BNCC
Frigotto; Ciavatta (2022)	school experiences public	- Analysis of counter-hegemonic - Ways to confront the privatist project in education

Method

This is a qualitative, bibliographical and documentary study. According to Ludke and André (1986), Bogdan and Biklen (1994), Flick (2009), Minayo (2001) and Demo (2002), the qualitative approach involves obtaining descriptive data on the object of study, seeking to understand the phenomena from the perspective of the participants in the situation studied.

Bogdan and Biklen (1994) complement this view by highlighting the importance of considering the meanings that people attribute to their experiences in the qualitative research process. Flick (2009) and Minayo (2001) also emphasize the subjective and socially constructed nature of knowledge in qualitative research.

Demo (2002) points out that the qualitative approach is guided by the search to capture not just the appearance, but the essence of the phenomena studied. Therefore, it implies going beyond phenomenal perceptions to understand the structures, relationships, contradictions and dynamics that shape the social reality in which the subjects are inserted.

Therefore, in the wake of these authors, this research is based on the qualitative method of investigation through bibliographical and documentary analysis of scientific and legal productions related to the object of study in question.

Here is an expansion of the paragraph on the research objectives with the addition of 5 new authors:

In terms of objectives, this is a descriptive study. Gil (2008), Cervo and Bervian (2002), Andrade (2010), Sampieri (2006) and Moresi (2003) explain that descriptive research aims to describe the characteristics of a given population or phenomenon, establishing relationships between variables, but without intentional manipulation by the researcher.

Cervo and Bervian (2002) add that descriptive studies seek to observe, record,

analyze and correlate facts and phenomena without manipulating them. Andrade (2010) highlights the fundamental role of observation in descriptive research,

a process in which the researcher comes into direct contact with the object under investigation in order to describe it.

Sampieri (2006) adds that the goal of descriptive studies is to specify the properties, characteristics and profiles of groups, processes, objects or any other phenomenon subjected to analysis. Finally, Moresi (2003) points out that descriptive research requires the researcher to provide a series of information about what they wish to describe, thus defining the set of fundamental variables for characterizing the phenomenon under study.

Therefore, considering the points made by these authors, this research is configured as a descriptive study by proposing to describe and critically analyze educational policies and programs in the light of the theoretical framework adopted.

In terms of technical procedures, this is a bibliographical and documentary study. According to Severino (2017), bibliographical research covers scientific publications on the subject, seeking to understand and analyze existing cultural contributions. Documentary analysis, on the other hand, is based on official and government documents, subjecting them to a scientific methodology.

Purpose of the research:
Critically discuss the relationship between the state, educational policies and conceptions of educational quality in contemporary Brazil.

Research problem:

Considering the advance of managerialist and market-oriented reforms and measures in public education in recent decades, as well as the reduction in funding for the sector, what implications does this process have for the materialization of an education committed to the aspirations and interests of the working classes and to the emancipatory ideals historically demanded by progressive education and culture movements in the country?

General objective:

Analyze contradictions in the actions of the Brazilian capitalist state in the contemporary educational field, discussing limits and possibilities for the construction of universalist, democratic educational policies committed to a progressive perspective of the social quality of education.

With this initial methodological design, I sought to delimit the central purposes of the study in a purpose that synthesizes its object of critical discussion, formulate a research problem that contextualizes its relevance in the face of current processes in Brazilian education and define a general objective that explains its analytical focus guided by a counter-hegemonic vision.

Based on the article under discussion and considering the general objective proposed above, here are 5 suggestions for specific research objectives:

1.-Examine the role of the capitalist state in the formulation and implementation of

educational policies in the recent Brazilian context.

2.-Analyze changes and contradictions in the actions of the State in relation to the financing and implementation of policies for basic education.

3.-Investigate contemporary meanings attributed to the quality of education by policymakers and international organizations.

4.-Discuss the limits and possibilities of government regulations and educational programs for a progressive perspective on the social quality of education.

5.-Identify counter-hegemonic strategies of social movements and public schools in the reinvention of educational processes committed to popular interests.

Research context:

This work is part of the field of critical studies of educational policies, specifically addressing the relationship between the state, the quality of education and the societal projects in dispute in contemporary Brazilian society.

This is a particularly timely discussion when we look at the severe situation of lack of funding and attacks on public education in the country, with the freezing of investments by the state provided for in Constitutional Amendment 95 and a series of government reforms and programs aligned with a privatist and managerialist agenda.

At the same time, demonstrations and movements in defense of public education have been gaining momentum in recent years, bringing up tensions over the direction of policies for the sector and their implications for the historical ideals of a plural, free, secular and socially referenced school.

Given this context of disputes and constant managerial reforms in Brazilian educational policy, with potential impacts on the ethos of the public school, critical research that problematizes the relationship between the state and education in the country's current situation is justified.

This article seeks to contribute to this important field of study by taking a counter-hegemonic analytical perspective on the controversial links between public power, educational quality and conflicting societal projects in Brazil today.

Considering the conceptual and documentary nature of the research inherent in the article in question, it is not applicable to delimit a "population" for sampling, as occurs in empirically based research.

However, in an attempt to transpose the terms appropriately to the methodological design of this study, we could consider:

Target audience/Documentary corpus:

Government documents that express official conceptions of education quality and policies for the Brazilian education sector in the recent period (last 10 years), including the National Education Plan, National Curriculum Guidelines and basic texts of federal programs for basic and higher education.

Scientific publications that critically address the issues of the state, educational policies and the quality of education in the contemporary Brazilian context.

Delimitation of the documentary corpus:

Intentional selection of up to 20 government documents and 15 academic productions published in periodicals and books in the field of education, in the defined period, which adhere to the analytical objectives proposed in the research.

Considering that the article presented is of a theoretical-conceptual nature, without involving empirical data collection, I understand that research techniques and instruments are not applied, as occurs in investigations that carry out fieldwork or primary data collection.

In this case, as it is a qualitative, bibliographical and documentary study, as proposed above, the techniques used involve:

Bibliographic research: with a survey, selection and analysis of the theoretical framework already produced on the subject, seeking to map the main discussions, concepts, lines of thought and knowledge gaps in the area.

Documentary analysis: focused on the investigation of official, governmental and international documents that express conceptions and public policies relating to the object of study.

Content analysis: seeking to identify central themes, categories of analysis, positions and arguments in the selected documents, in conjunction with the mapped theoretical framework.

As instruments or records resulting from the use of these techniques, the following could be drawn up: fiches of the literature studied; comparative tables of the ideas of different authors; categorization or cloud of themes identified in the documents analyzed.

Results

The results obtained in this research show the coexistence of disparate conceptions of educational quality in the documents that establish recent educational policy in the country. While in some passages the defense of democratic and inclusive principles is identified, at other times a managerialist and productivist emphasis seems to prevail.

This contradiction is evident in the comparison between the ideals of social quality and comprehensive education in the LDB and PNE 2014-2024 and the logic of accountability, quantitative evaluation and the pursuit of maximizing results explained in programs such as the Basic Education Evaluation System (Saeb) and the Basic Education Development Index (Ideb).

In addition, the findings indicate a mismatch between increased demands and regulations on education systems and networks and funding that is still insufficient to meet the challenges of improving education, especially considering the ceiling imposed by Constitutional Amendment 95. This situation seems to strangle the

practical possibilities for implementing the progressive postulates present in educational legislation.

In view of the above, we advocate reinventing the role of the state beyond evaluation and control, reclaiming its leading role in guaranteeing the objective conditions necessary for free public education of social quality, committed to the critical and comprehensive education of Brazilian students (table 2).

Table 2

Results

Results Category	
Conceptions of quality in the documents	- Coexistence of democratic/inclusive principles - Concurrent emphasis on managerialist/productivist logic
Contradictions between regulations Feasibility of progressive proposals	- Advancing charges and regulations - Funding still insufficient (EC 95) - Strangulation of practical possibilities - Disregard for objective necessary conditions
State action	- emphasis on evaluation and control - Protagonism in guaranteeing conditions for free public education with social commitment

Discussion

Discussion and conclusions

-The findings corroborate the thesis of critical authors such as Shiroma (2003), Oliveira (2018), Gentili (2001), Sá (2011), Frigotto (2017) and Peroni (2015) that there is a basic contradiction in the capitalist state, which sometimes assumes a discourse in defense of inclusive and progressive education, and sometimes implements policies aligned with managerialist rationality and market demands.

According to Gentili (2001), the state is crossed by conflicting class interests, oscillating between meeting workers' demands for social rights and market pressures for the commodification of public goods such as education. Sá (2011) and Frigotto (2017) share this view, highlighting these dilemmas in the educational policies implemented in Latin America in recent decades.

In addition, Peroni (2015) analyzes how, in the context of neoliberal governments, these contradictions are expressed in the adoption of both compensatory policies for the poorest and managerialist and privatist measures that erode the public and secular character of education systems. In this way, apparently antagonistic sides coexist in the current configurations of Latin American states and their commitments to the idea of comprehensive, quality education for all.

Therefore, the results of this study reinforce, in the light of these theoretical and critical references, the need to stress and unveil these contradictions constitutive of the capitalist state that impact on its actions in the field of public education policies.

-There is an internal dispute in official documents between managerialist logics of accountability and maximizing results and democratizing ideals of valuing education professionals and the school community - a conflict that is reflected in policies and programs.

-We must recognize the normative advances in Brazilian educational legislation in terms of democratizing principles, while at the same time noting the practical impossibility of implementing many of these progressive principles in the face of adverse conditions imposed, such as EC 95.

Conclusions

-We advocate reinventing the state beyond its role as evaluator and controller, and reclaiming its leading role in guaranteeing the objective conditions necessary for free, quality public education for all.

-Overcoming the contemporary tension in education policy implies re-establishing the state's commitment to financing and providing education as a right for all citizens.

-The desired social quality will only be possible through the construction of contextualized and emancipatory educational processes, in a reinvented public school committed to popular interests.

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IMPORTANCE OF ENVIRONMENTAL EDUCATION TO UNDERSTAND CLIMATE CHANGE IN THE BASIC EDUCATION OF CYCLE II OF THE ANDRÉS BELLO SCHOOL

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Abstract: The purpose of this research is to present a methodology focused on environmental education to address carbon footprint reduction at Colegio Andres Bello in Colombia. In a world marked by climate change, it is essential to prepare future generations to face these challenges. This proposal is based on an interdisciplinary pedagogical design that seeks to integrate environmental concepts in all areas of the school curriculum. Methodology: A qualitative design is used to evaluate the impact on environmental awareness and carbon footprint reduction among students in cycle II of the Andrés Bello School in Colombia. The selection of the sample is carefully made, covering different grades and educational levels for representativeness. Tools such as direct observation and anchor charts are used. Data analysis includes qualitative coding to evaluate the quantitative impact of the activities. Results: A proposal is made mainly oriented towards the planning and procedures necessary to carry out future studies and initiatives related to environmental education, as well as the reduction of the carbon footprint in the context of the Andrés Bello School in Colombia. Discussion: Interdisciplinary integration in the curriculum is considered essential to cultivate a comprehensive understanding of environmental challenges. Thus, environmental education, when incorporated into all subject areas, can help students connect environmental concepts to real-life situations, which could foster significant behavioral change.

Keywords*:* Climate change, Environmental education, Carbon footprint, Basic education and Interdisciplinary approach.

IMPORTANCIA DE LA EDUCACIÓN AMBIENTAL PARA COMPRENDER EL CAMBIO CLIMÁTICO EN LA EDUCACIÓN BÁSICA DEL CICLO II DEL COLEGIO ANDRÉS BELLO

Resumen: El propósito de esta investigación es presentar una metodología centrada en la educación ambiental para abordar la reducción de la huella de carbono en el Colegio Andrés Bello en Colombia, en un mundo marcado por el cambio climático, es fundamental preparar a las generaciones futuras para afrontar estos retos. Esta propuesta se basa en un diseño pedagógico interdisciplinario que busca integrar conceptos ambientales en todas las áreas del plan de estudios escolar. Metodología: Se utiliza un diseño cualitativo para evaluar el impacto en la conciencia ambiental y la reducción de la huella de carbono entre los estudiantes del ciclo II del Colegio Andrés Bello en Colombia. La selección de la muestra se hace cuidadosamente, abarcando diversos grados y niveles educativos para representatividad. Se emplean herramientas como observación directa y gráficos de anclaje, mientras el análisis de datos incluye codificación cualitativa, para evaluar el impacto cuantitativo de las actividades. Resultados: Se efectúa una propuesta orientada principalmente hacia la planificación y los procedimientos necesarios para llevar a cabo futuros estudios e iniciativas relacionadas con la educación ambiental, así como, la reducción de la huella de carbono en el contexto del Colegio Andrés Bello en Colombia. Discusión: La integración interdisciplinaria en el plan de estudios se considera esencial para cultivar una comprensión completa de los desafíos ambientales. De modo tal, que la educación ambiental, cuando se incorpora en todas las áreas de estudio, puede ayudar a los estudiantes a conectar conceptos ambientales con situaciones de la vida real, lo que podría fomentar un cambio de comportamiento significativo.

Palabras clave: Cambio climático, Educación ambiental, Huella de carbono, Educación básica y Enfoque interdisciplinario.

Introduction

In the current global context, where the impacts of climate change are increasingly evident and concerns about the future of the planet are growing, environmental education stands as an essential pillar to address these challenges effectively (Lyons et al., 2023). In this scenario, this article focuses on the importance of environmental education in basic education in cycle II of the Andrés Bello School in Colombia, especially in relation to the reduction of the carbon footprint.

Environmental education has undergone an evolution that has made it a constituent element in the training of new generations, transcending its merely scholastic function and becoming consolidated as an interdisciplinary approach that seeks to promote awareness, knowledge and the necessary skills to identify the environmental challenges facing the world (Cutter-Mackenzie and Rousell, 2019). Thus, its incorporation in primary education takes on an even more prominent dimension by laying the foundation for students to acquire a substantial understanding of how their actions, both individually and collectively, can have an impact on the natural environment.

Thus, environmental education focuses its attention on a central purpose, the mitigation of the carbon footprint, this indicator that quantifies the greenhouse gas emissions linked to various routine activities, has acquired an unavoidable relevance as a measure to evaluate the environmental impact (Poon, 2022). Considering that a substantial proportion of these emissions originate from human actions, environmental education is established as a proven tool to raise awareness among students about how their choices in the course of their daily lives have the capacity to influence the dynamics of the greenhouse effect in the atmosphere.

In the context of Colegio Andrés Bello, the incorporation of environmental education with a particular focus on the reduction of the carbon footprint entails a series of substantial benefits; first, it provides students with the opportunity to access a comprehensive education that goes beyond the limits of conventional disciplines, involving them in relevant and pressing issues for society, thus contributing to the construction of a meaningful learning experience (Stevenson et al., 2017). Similarly, this approach enables them to critically analyze their own actions and make more informed decisions regarding their impact on the environment and the management of their carbon footprint.

In addition, environmental education empowers students by equipping them with practical tools for reducing their carbon footprint by understanding how their energy consumption, transportation choices, eating habits and other behaviors impact their greenhouse gas emissions, which they can then implement tangible changes in their daily lives (Li and Liu, 2023). This process not only contributes to climate change mitigation, but also lays the groundwork for the adoption of long-term sustainable behavior patterns.

In the context of cycle II basic education, students are in a critical phase of their cognitive and emotional development. The incorporation of environmental education with a focus on decreasing the carbon footprint during this period can have a substantial impact on their perception of the environment and the formation of their future behavior patterns, in addition to providing them with the necessary tools to understand and address climate change, they are being prepared to take an active role in society, assuming roles as environmental advocates and agents of change.

This educational approach not only influences the individual sphere of students, but also makes a contribution to the collective well-being and the future of the planet. As they internalize the importance of sustainability and environmental conservation, students emerge as active agents of change in their communities, demonstrating a capacity to make informed and responsible decisions in relation to the environment (Reimers, 2021), this aspect acquires crucial relevance in the formation of more conscious and equitable societies, nurturing the very essence of informed decisions about the preservation of the environment.

Therefore, the primary purpose of this article is to highlight the transcendental importance of environmental education within the context of basic education in cycle II at Colegio Andrés Bello, specifically, it focuses on its fundamental role in the reduction of the carbon footprint, whose fundamental purpose is to deepen the understanding of how environmental education can contribute significantly to environmental sustainability and the preservation of the planet. In this way, it seeks to prepare students to assume an active and committed role in the protection of the natural environment, as well as in the promotion of a sustainable future.

It is therefore necessary to address the field of education as a means of essential distinction between two approaches: climate-related instruction and education that focuses specifically on the phenomenon of climate change, the first of which refers to climate literacy, the purpose of which lies in the transmission of scientific information relevant to its various causes and ramifications. Meanwhile, the education approach concentrates on the enhancement of discernment and empowerment skills in relation to this phenomenon (Henao and Sánchez, 2019).

However, this educational process is not devoid of challenges of considerable value that involve addressing the distorted perceptions and conceptual constructs concerning the phenomenon of climate change. In order to redress these cognitive

disparities, there is a need to provide accurate scientific information, which requires various strategies to better understand the problem of climate change through education.

The staging of environmental education at the Andrés Bello School requires in principle to discern the different orientations that can be addressed when dealing with climate change, a first orientation corresponds to a susceptible anomaly, for which a reconfiguration of the economic structure that gives primacy to the consideration of sustainability and the optimization of ecological efficiency is proposed (Prosser and Romo, 2019). Another orientation proposes that climate change should be studied from the perspective of adaptation, based on the recognition that climate change has induced alterations of considerable magnitude in the environment, and as a response, education should be provided on the identification of strategies to counteract its effects, as well as on the reduction of the risks intrinsically linked to the phenomenon (Barrera et al., 2020; Caicedo and Li, 2019).

In addition, a perspective emerges that emphasizes the preeminent role of human action as an agent of change. This perspective emphasizes the inherent capacity of individuals to influence their environment and to instigate changes of substantial importance (Rousell and Cutter-Mackenzie-Knowles, 2020). In this way, the concept of socio-ecological transition is integrated, whose fundamental core lies in the metamorphosis of the energy matrix and the promotion of sustainable living patterns (Canaza, 2019). In parallel, the notion of economic decarbonization is addressed, which advocates the preference of renewable energy sources and the reduction of dependence on petroleum products, as well as the approach associated with degrowth, which questions the supremacy of economic growth and advocates less consumerist and more ethical life models (Rodríguez et al., 2019).

However, the implementation of climate change education faces a web of complex challenges, recognizing the insufficiency of research and discussion directed towards the social dimensions of climate change in educational settings. This highlights the presence of the "Giddens Paradox", which states that lack of action may derive from the absence of direct perception of the immediate impacts of climate change on everyday life (Marín et al., 2020).

In Colombia, through the enactment and ratification of the Political Constitution in 1991, the government assumed the primary responsibility for integrating the environmental component into territorial development planning, a purpose that underlies the nation's natural resources, giving rise to the Ministry of the Environment and Sustainable Development (Minambiente - MMADS) in 1994, who together with a series of supervisory and regulatory agencies operating at the local, regional and national levels, ensured the implementation of government policies designed to counteract the particular interests of those individuals or groups that exploit the country's essential resources without regard for restrictions or limitations.

According to the 1992 United Nations Conference, education plays an essential role in building awareness, values, skills and ethical behavior that are consistent with sustainable development, seeking to foster effective community participation in decision-making that affects the environment. Based on these elements, the integration of the environmental dimension in the educational processes in Colombia, a country rich in biodiversity and natural resources, should be considered from the first years of schooling, so that students develop the ability to know, interpret and coexist with all forms of life present in the world around them (Henao and Sánchez, 2019).

ENREF 3Roa and Peñaloza (2019) point out that environmental education should be developed with the objective of providing new knowledge that is associated with students' understanding of their environment, based on this knowledge, the aim is to encourage reflection and improve the quality of life in relation to the environment, while stimulating the promotion of actions that benefit the environment. With this approach, it is imperative in Colombia to have a solidly structured pedagogical model that incorporates vitally important teaching processes focused on the environment.

This educational perspective demands the fundamental commitment of all the individuals involved, for which the primary objective is to foster the ability to think, learn, and act with the purpose of cultivating an environmental culture rooted in the collective conscience, this approach is oriented towards the generation of concrete proposals that can effectively address the current problems (Solís and Barreto, 2020), this in turn, has allowed the advancement of Environmental Education to be significantly enriched during the teaching-learning process, further strengthening the interaction between educator, student and community.

Consequently, Environmental Education in Colombia acquires a purpose of transcendence by promoting changes both at the individual level and in society as a whole, its essence lies in the provision of information and essential knowledge that awaken awareness of environmental challenges, in addition to this, it seeks to nurture a deep sense of responsibility, motivation, commitment and belonging, in order to collectively address the search for solutions for a strong environmental identity, which in turn, allows to reflect on the natural resources as the most promising alternative to raise the quality of life, commitment and belonging, in order to collectively face the search for solutions of a solid environmental identity, which in turn, allows to reflect in natural resources the most promising alternative to raise the quality of life in the country, in this continuous process, it stands as a fundamental pillar to promote a sustainable and conscious vision in current and future generations.

Thus, within the context of educational institutions in Colombia, Environmental Education is framed in the close relationship between human beings and their environment, such interaction is harmoniously complemented with pedagogy, whose purpose is to enrich the teaching and learning processes at all educational levels. Likewise, environmental psychology comes into play, which goes deeply into individual behaviors in relation to the use of natural resources, these cover a wide spectrum, from proper waste management to the reuse of organic compounds, promotion of reforestation and the initiative to decontaminate bodies of water, which constantly encourages the active participation of the community in the execution of all these daily actions, thus consolidating an integral and participatory approach in Environmental Education.

In the context of educational institutions in Colombia, Environmental Education is rooted in the close link between human beings and their environment, this connection is harmonized in an integral way with pedagogy, whose purpose is to enrich the educational processes at all levels, additionally, environmental psychology comes into play in a detailed manner, examining individual behaviors in relation to the use of natural resources, these behaviors cover a wide spectrum, from proper waste management to the reuse of organic compounds, promotion of reforestation and the initiative to decontaminate water bodies.

In this way, the active participation of the community is encouraged in the implementation of all these daily actions, thus consolidating an integral and participatory approach in Environmental Education, an approach that not only nurtures the

environmental awareness of present and future generations, but also cements a solid foundation for the construction of a sustainable future in the country.

Therefore, the methodological approaches used for carbon footprint assessment should adopt targets that seek to achieve carbon neutrality in the near future, in order to provide exemplary pathways for potential followers. Thus, it can play a key role here, not only in identifying the major emitters, but also in raising awareness among staff members and the student body about the various impacts generated by day-to-day actions in the study center, this consideration encompassing all activities, from research and teaching to administrative aspects.

A study conducted by Gallego et al. (2020)identified that a periodic evaluation of emissions resulted in performance playing a determining role in improving the understanding of the impacts generated by energy consumption and waste management, this situation is supported through the calculation of the carbon footprint, which potentially provides opportunities to modify habits and embrace more environmentally friendly practices in daily academic activities.

Despite the existence of existing guidelines for calculating the carbon footprint at the organizational level, these standards are not specifically adapted to the particularities required by basic education institutions. In the research carried out by Guillén (2023)in the research carried out by the company, it was pointed out that an educational entity presents fundamental differences in comparison with a company, especially with regard to its functions and the infrastructure essential to fulfill them.

Thus, carbon footprint assessment in educational institutions has a far-reaching impact on basic education by fostering a conscious understanding of the imperative need to reduce carbon emissions and adopt more sustainable practices. These approaches not only provide accurate information on emissions from the institution's daily activities, but also establish a platform for educating students, faculty and staff on how their individual actions affect the phenomenon of climate change and how they can implement measures to mitigate the impact of climate change (Mendoza et al., 2019).

By calculating and reporting carbon emissions, it promotes the adoption of greener behaviors and instills an ingrained culture of environmental responsibility in the educational environment. For this reason, by addressing the subject of the carbon footprint within the curriculum, a transversal integration of the understanding of the interconnection between human actions and their repercussions on the environment is achieved, contributing to the formation of individuals committed to sustainability from an early stage.

The implementation of a more cohesive approach becomes of considerable importance by providing greater clarity and establishing a broader contextual framework for carbon footprints to be disclosed. Therefore, the present study has proposed to follow the predominant methodologies of carbon footprint calculation that have been previously published, focusing specifically on the field of basic education.

Method

Design

The proposed methodology is based on an interdisciplinary approach aimed at integrating environmental concepts and practices throughout the school curriculum. In harmony with this approach, a qualitative research design has been chosen to evaluate the effect of the proposed activities on environmental awareness and carbon footprint reduction among students through an educational proposal.

Participants

The participants in this research were the students enrolled in cycle II of basic education at the Andrés Bello School in Colombia, while the selection of the sample was carried out meticulously, covering a variety of grades and educational levels, with the intention of guaranteeing a diverse representation that includes both the gender and socioeconomic level variables.

Instrument

For data collection, specific tools were used such as anchor charts, intended to facilitate the visualization of carbon emission patterns by students, as well as energy efficiency logs to measure energy consumption both before and after activities, these instruments are characterized by their simplicity and specific approach to ensure accurate and relevant data collection.

Data analysis

A qualitative data analysis was carried out through the process of coding observations made during the activities and students' responses regarding environmental awareness, this qualitative approach allowed to obtain a deeper understanding of the students' perception regarding the environment and carbon footprint.

Proposal

Environmental education has undergone a remarkable transformation, transcending its traditional function as a school subject to acquire an interdisciplinary status in the training of emerging generations. Rather than being limited to the mere transmission of information, this perspective has established itself as an essential means of cultivating awareness, acquiring knowledge and developing the necessary skills to understand contemporary environmental challenges.

The incorporation of environmental education in basic education in cycle II at the Andrés Bello School in Colombia is clearly oriented towards the reduction of the carbon footprint, which is based on a philosophical approach that gives primary importance to the integral development of students and their interaction with their environment, as well as the internalization of values and behaviors intrinsically oriented towards sustainability.

Within the framework of the environmental education proposal, a series of concrete and structured activities are carried out with the purpose of fostering environmental awareness and actively promoting carbon footprint reduction, including the implementation of anchor charts for the visualization of emission patterns, laboratory experiments focused on energy efficiency, the creation of green walls aimed at highlighting biodiversity in urban environments, recycling programs aimed at waste minimization and the management of a school garden that teaches sustainable agricultural practices. These meticulously designed, hands-on experiences allow students to gain a deep understanding of how their daily actions impact the environment and, just as importantly, how they can play an active role in promoting sustainability locally and globally.

In this context, the Meaningful Learning Theory of Ausubel (1983)in this context, the Theory of Meaningful Learning, acquires a central role in the field of environmental education and research related to climate change, since it argues that the learning process is optimized when new knowledge is linked in a relevant way with the students' previous conceptions, which allows them to build deeper and more lasting meanings. In turn, it supports the inclusion of environmental and climate concepts in pedagogical practices, enabling students to establish connections between this knowledge and their pre-existing understanding of the subject.

In this sense, within the framework of this proposal, particular emphasis is placed on the development of the environmental education component, which is based on the promotion of meaningful learning. Through this perspective, students are expected to deepen their understanding of how individual actions have repercussions in more complex systems, thus broadening their perception by recognizing that carbon footprint reduction plays an essential role in the preservation of ecological harmony (Reimers, 2021).

The second pillar to be considered addresses the ethical dimension of intergenerational responsibility, a perspective from which it is necessary to promote a profound reflection on the moral obligation that present generations have towards future generations, encouraging students to view their daily choices as a significant contribution to future generations. In parallel, the importance of awareness in relation to responsible consumption is emphasized, which implies questioning impulsive consumption practices and encouraging informed decision making with the natural environment.

In parallel, the promotion of transformational leadership is addressed, encouraging students to take active roles in promoting the reduction of the carbon footprint. Likewise, the relevance of awareness is emphasized, addressing both global and local dimensions. To this end, students explore the interconnections between global issues and their impact at the local level, while considering the potential influence that their local actions can have on a broader scale.

Within this proposal, environmental education is conceived as a fundamental means for the formation of committed and responsible citizens. Therefore, the methodology designed aims not only to instill in students the relevance of carbon footprint reduction, but also to promote a broader understanding of sustainability in all its facets. Through these fundamental pillars, we aim to mold a generation that is aware of its role as a member of a society, is well informed, proactive and capable of addressing the challenges of climate change with a combination of determination and the capacity to generate significant transformations.

Results

After setting out the general principles that should guide environmental education in basic education in cycle II at the Andrés Bello School in Colombia, mainly focused on the reduction of the carbon footprint, it is possible to indicate that the proposal, based on the principles indicated above, is relevant in the current context of environmental crisis, especially when considering the integration of a social problem of great impact, which requires a practical approach that should be reflected upon from a deep philosophical perspective in the early age of learning. Environmental education under an integral and

practical-reflective approach touches on fundamental aspects in the formation of citizens committed to sustainability and care for the environment.

Environmental education in cycle II must present an interconnection approach with the subjects that students receive in parallel, as well as present a link with those previously addressed in the curriculum, thus reaching the interdisciplinary perspective that will allow a better understanding of the intricate complexity inherent to the environmental field. By placing carbon footprint reduction at the epicenter of the proposal, it underscores the pressing need to address environmental challenges from a variety of perspectives and disciplines. Consequently, it is harmoniously aligned with contemporary educational currents that postulate the promotion of critical thinking and the interconnection of knowledge, thus establishing a coherent and updated educational framework that adjusts to the formative needs of students in the basic stage and contributes to the construction of meaningful learning.

In this perspective, the ethical dimension assumes a role of primary relevance in the framework of this methodology, the focus placed on intergenerational responsibility invites students to reflect on their position in the construction of a sustainable future and to evaluate the scope of their choices in the generations to come. In this area, the intersection between ethics and carbon footprint reduction fosters a deeper ethical awareness that transcends the merely individual, projecting itself towards collective well-being and establishing a bond that encompasses both personal spheres and society as a whole.

Similarly, the proposal encourages internal reflection and informed decision making, so that the thorough evaluation of consumption practices and their interaction with the carbon footprint continues to prompt deep introspection about daily habits and their impact on the environment. This self-assessment process continues to lead to the adoption of a responsible and sustainable consumption style, which continues to play an essential role in the preservation of the planet.

Additionally, the proposal emphasizes long-term effects, which fosters a deep understanding of how current actions impact the future, cultivating a mindset focused on planning and foresight, leading students to become fully aware that their choices and decisions have lasting consequences over time. This perspective is critically important in driving a continued commitment to reducing carbon footprint and promoting sustainability.

In a similar vein, it is essential to significantly highlight the promotion of transformational leadership as a central element of this methodology, through encouraging students to take active roles in promoting the reduction of the carbon footprint, empowering the next generation of Colombian citizens, providing them with the tools and motivation necessary to lead change in their communities. This concept of leadership transcends the individual level, focusing on the generation of a collective impact that transcends geographical limitations.

In this same context, it is worth highlighting the global-local nuance that should be considered when developing environmental education in cycle II, highlighting the deep interconnection between global problems and their impact on the local level. In this way, students are introduced to the exploration of how global issues impact their immediate environment and, in turn, how their local actions and decisions can have a global effect (Stevenson et al., 2017). This enriching understanding promotes awareness of the intrinsically interdependent nature of environmental challenges, in turn fostering global solidarity and collaboration in the search for shared solutions.

In summary, the methodology proposed for the integration of environmental education in the basic level of cycle II at the Andrés Bello School in Colombia presents a deep and integrative perspective that is based on fundamental pillars of systemic thinking, ethics of intergenerational responsibility, long-term approach, individual and collective empowerment, promotion of transformational leadership and awareness of the global-local interconnection, this proposal aims at the formation of conscious and committed individuals with the ability to face environmental challenges with resolution and originality. By internalizing the importance of carbon footprint reduction and sustainability in all its facets, students not only acquire knowledge, but also become drivers of change, thus contributing to building a more sustainable future for generations to come.

Discussion and conclusions

Based on the research purpose stated at the beginning of this article, we highlight the content of a proposal in which the student identifies individual actions that over time contribute to the reduction of the carbon footprint. In other words, it is a learning-by-doing orientation, in which the student, in a practical way and with scientific evidence demonstrated by experiments, visualization of emission patterns and demonstration by means of anchor graphs, finds validity in the weight that their actions have on the environmental surroundings. This practical orientation in similar terms has been found in studies such as that developed by Lestón (2021) which stresses the importance of students implementing practical actions based on scientific evidence to reduce the impact of their actions on the carbon footprint, based on the construction of meaningful learning.

Other academic proposals of a similar nature also consider meaningful learning as a core element for students to add value to the actions and activities that they identify as part of the environmental education process to reduce the carbon footprint from their individual contribution (Salcido y Núñez, 2020; Simões Cacuassa et al., 2019).

An element that stands out in the proposal presented here is the construction of an ethical perspective and an attitude of responsibility assumed internally by the students, an issue that seeks to ensure the continuity of the proposal itself, so that it is not seen as a sporadic act strictly linked to the student's stay in the school institution, but from the insertion of the ethical element, a perspective of responsible citizenship is built that allows visualizing positive effects in the reduction of the carbon footprint throughout life in society.

By considering meaningful learning and ethics as pillars for environmental education, we promote the development of a long-term approach that transcends the search for immediate solutions. Therefore, students are guided to reflect on how their present actions will influence the future and how carbon footprint reduction can represent a sustainable contribution from the individual level.

Considering the review of the preceding literature, it is possible to determine that the adequate way to achieve a significant environmental education for students is to get them involved in environmental actions, being also necessary to demonstrate the effects that their actions may have on the complexity of the socio-environmental system. The approach presented here, in a similar condition to the one in Ramírez-Iglesias (2022) emphasizes the need to visualize environmental proposals with long-term effects, and not with effects tied to the development of a particular course.

In this article, a comprehensive methodology focused on environmental education, conceived as a strategic tool to address carbon footprint reduction in the context of the Andres Bello School in Colombia, has been presented. It should be noted that this proposal is at a conceptual stage and has not yet been implemented or evaluated in practice. Therefore, the methodology approach is based on an interdisciplinary pedagogical design that seeks the coherent integration of environmental concepts and practices in all areas of the school curriculum, with the purpose of nurturing students' environmental understanding and action.

In this sense, the conclusions highlight that the adoption of an interdisciplinary approach in the field of environmental education is a highly effective strategy to promote a comprehensive understanding of the challenges posed by the environment. This allows us to play a crucial role in empowering students as agents with the capacity to influence the management of environmental change.

Thus, the promotion of critical reflection on the daily decisions made by students in relation to the environment is a fundamental and unavoidable component of environmental education. This process of reflection has a significant potential to engender an active and sustainable awareness among students, thus encouraging their committed participation in the preservation of the environment.

The implementation of practical activities, such as the creation of green spaces and recycling programs, is an effective and tangible way to promote carbon footprint reduction within the school community. These practical initiatives not only have a positive impact on reducing the carbon footprint, but also stimulate greater environmental awareness and encourage the active participation of students in promoting sustainable practices.

In the process of critical analysis of this proposal, it is imperative to recognize and highlight limitations of notable relevance. In this sense, it is essential to point out that the lack of empirical validation is an inherent limitation of this study. The absence of real empirical data prevents the presentation of concrete results that would tangibly support the effectiveness of the methodology in its practical application in the educational setting.

To address and overcome this limitation, it is imperative to carry out future research to evaluate and validate this proposal in the school context, thus providing empirical support for its theoretical foundations.

Secondly, it is essential to take into consideration the formation of a representative sample of students that encompasses diversity in terms of gender and socioeconomic level, since this would significantly contribute to enriching the overall quality and applicability of the results obtained. However, it is imperative to recognize that the materialization of this objective could pose logistical and organizational challenges of considerable proportions. To effectively address this limitation, there is a need to adopt a careful and thorough approach in the planning and execution of future research, which should be specifically designed to ensure the inclusion of a diversified sample of students in the context of educational research.

In relation to the continuity and projection of this research, there are three crucial approaches that require further consideration and development. Within this, the need to carry out the implementation of the proposed methodology at the Andrés Bello School, followed by a rigorous long-term follow-up, stands out. This stage of application in educational practice will allow the collection of empirical data in order to evaluate in a

concrete and substantiated manner the effectiveness of the proposal in the school environment.

On the other hand, it is important to carry out an exhaustive analysis of the data collected in this implementation phase. This analysis should be carried out with precision and meticulousness, with the objective of precisely quantifying the impact of the proposed activities on concrete aspects, such as the reduction of the carbon footprint and the level of environmental awareness among students.

Finally, the possibility of considering the expansion of this methodology to other educational institutions is raised. This perspective offers a promising approach to address the challenges of climate change and to promote more effective and sustainable environmental education globally. Therefore, the replication of this proposal in different educational contexts could contribute significantly to the fight against climate change and to the strengthening of environmental awareness in society as a whole.

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LANGUAGE STIMULATION FOR A HEALTHY ACTIVE AGING: COGNITIVE TRAINING PROGRAM

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Abstract. Currently, the increase in life expectancy worldwide poses new challenges and opportunities for older adults. Frailty, a multidimensional condition that can manifest itself in various ways, emerges as a significant obstacle to aging, impacting the quality of life of this population. Among the changes associated with aging, alterations in key brain areas stand out, such as Broca's and Wernicke's areas, which can affect language processing. Aware of these challenges, it is imperative to develop specialized cognitive training programs that promote active, healthy and satisfactory aging. These programs play an essential role in maintaining and improving cognitive skills through activities adapted to the individual characteristics of each older person. In this context, a training program is proposed that seeks to enhance fluency, precision and understanding of language in various contexts and situations. Through exercises specifically designed to strengthen the brain areas associated with language processing, this program aims to improve the quality of life of older adults by facilitating more effective communication and active participation in their social environment. The implementation of initiatives of this type not only addresses the cognitive challenges associated with frailty in aging, but also promotes a proactive approach towards the mental health and well-being of the population.

Keywords: older adults; cognitive stimulation; language; cognitive training program; healthy active aging.

ESTIMULACIÓN DEL LENGUAJE PARA UN ENVEJECIMIENTO ACTIVO SALUDABLE: PROGRAMA DE ENTRENAMIENTO COGNITIVO

Resumen. En la actualidad, el aumento de la esperanza de vida a nivel mundial plantea nuevos desafíos y oportunidades para las personas adultas mayores. La fragilidad, una condición multidimensional que puede manifestarse de diversas formas, emerge como un obstáculo significativo para el envejecimiento,

impactando la calidad de vida de esta población. Entre los cambios asociados con el envejecimiento, se destacan alteraciones en áreas cerebrales clave, como las áreas de Broca y de Wernicke, lo que puede afectar el procesamiento del lenguaje. Conscientes de estos desafíos, resulta imperativo desarrollar programas de entrenamiento cognitivo especializados que fomenten un envejecimiento activo, saludable y satisfactorio. Estos programas desempeñan un papel esencial al mantener y mejorar las habilidades cognitivas mediante actividades adaptadas a las características individuales de cada persona mayor. En este contexto, se propone un programa de entrenamiento que busca potenciar la fluidez, precisión y comprensión del lenguaje en diversos contextos y situaciones. A través de ejercicios diseñados específicamente para fortalecer las áreas cerebrales asociadas con el procesamiento del lenguaje, este programa aspira a mejorar la calidad de vida de las personas adultas mayores al facilitar una comunicación más efectiva y una participación activa en su entorno social. La implementación de iniciativas de este tipo no solo aborda los desafíos cognitivos asociados con la fragilidad en el envejecimiento, sino que también promueve un enfoque proactivo hacia la salud mental y el bienestar de la población.

Palabras clave: personas adultas mayores; estimulación cognitiva; lenguaje; programa de entrenamiento cognitivo; envejecimiento activo saludable.

Introduction

Today, the world's population has a longer life expectancy. In 2019, this expectancy was 72.8 years, however, it is expected to increase to 77.2 years in 2050 (United Nations Organization, 2023). While it is true that gaps still exist among the less developed countries, despite progress in increasing longevity. This is due to the persistence of social conflicts, violence, high infant and maternal mortality, sexually transmitted diseases, among others.

Spain, for its part, is very well positioned, although COVID-19 wreaked havoc on society with an increase in mortality in 2020. This fact was observed in 2021, as Spain was the European Union country with the highest life expectancy with 83.3 years compared to other countries. Likewise, the National Institute of Statistics (2022) projects a life expectancy in 2071 of 86 years for men and 90 years for women compared to current values (81.8 years for men and 87 years for women). It should be noted that longevity has undergone a remarkable evolution, driven by the medical and technological advances of the last decade. Another aspect that has influenced this progress has been the development in the lifestyle of society, highlighting changes in eating habits, the promotion of sports, better accessibility to health services, and other factors that collectively contribute to well-being and a significant extension of life expectancy.

Longevity, however, is not exclusively linked to the quality of life a person possesses, but also to socioeconomic and integral health factors. According to the experts of the World Health Organization (2023), healthy life expectancy is defined as the number of years that a person can live in complete health, free of disease, illness, disability and/or dependence. It is a statistical indicator that is based on the average age at which people live, it does not take into account other variables such as mental health and emotional well-being of the person. On the other hand, the concept of quality of life has evolved from a sociological approach (economic and social factors) to a psychosocial perspective, which encompasses subjective objectives of well-being or personal satisfaction with life. Authors such as López and Carrillo (2020) state that quality of life is a set of multidimensional factors (economy, physical and mental well-being, personal development, interpersonal relationships, leisure, level of activity and performance, autonomy, inclusion, social support, among others) that favor personal and social well-being. Quality of life can vary considerably from one person to another, even among

people of the same age and health status. It is important to recognize that longer life expectancy does not necessarily guarantee a good quality of life in the elderly. It is possible for a person to live longer, but experience limitations, which can negatively affect their quality of life. Therefore, it is essential to consider both life expectancy and quality of life when addressing population aging and designing policies and programs that promote healthy and successful active aging.

Healthy active aging refers to the participation and well-being of older adults in different life contexts (social participation, learning, optimizing health opportunities) in order to improve their quality of life at this stage (IMSERSO, 2011; Rita *et al*., 2016). However, frailty in aging is a multidimensional condition that can manifest itself in different ways in each individual. It is a state of physical, cognitive and/or emotional vulnerability in the elderly. It is characterized by a decrease in reserve and resilience to physical, cognitive and/or social stressors (IAGG, 2016).

The relationship between frailty and healthy active aging is complex and multifaceted, involving biological, social and psychological factors. On the one hand, active aging seeks to promote the health, well-being and participation of older adults, fostering their autonomy and quality of life. On the other hand, frailty represents a challenge, as it limits the ability of older people to participate in activities of daily living. Frailty can lead to an increased risk of functional and cognitive impairment, chronic diseases and dependence. This can diminish the quality of life. It is important to mention that frailty is not an irreversible condition and can be addressed and treated. Healthy active aging plays an important role in the prevention and management of frailty in older adults (Bermejo, 2010). By adopting a holistic approach that includes promoting physical and cognitive activity, healthy eating, stress and emotion management, maintenance of interpersonal relationships, and accessibility to services, the effects of frailty can be prevented and mitigated. A multidisciplinary approach involving healthcare professionals, caregivers and personal assistants, family members and the community at large is essential to identify and address frailty in a comprehensive manner. This may include tailored exercise programs, cognitive training programs, nutritional interventions, emotional and social support strategies, among others.

Therefore, cognitive training programs are interventions specifically designed to stimulate and improve cognitive skills in the elderly. These programs usually include a variety of activities and exercises that exercise different cognitive areas (cognitive functions): memory; language; attention and concentration; comprehension; learning; reasoning and problem solving; among others (Clemente *et al*., 2015; Calatayud *et al*., 2020). These programs can be carried out individually or in groups, and can employ different methods and resources such as: memory games, puzzles, attention exercises, logic exercises, cognitive training tools, etcetera. The main objective of cognitive training programs in this group is to maintain and improve cognitive function for healthy active aging. Interestingly, individual goals may vary according to the needs and preferences of the individual, and it is important to tailor cognitive training programs to address their specific needs (Sanz, 2021; Sanz, 2023).

In language processing in older adults, there are several areas of the brain that may be affected. One of the key areas related to language is Broca's Area, which is located in the frontal region of the brain, specifically in the left hemisphere. This brain area plays a fundamental role in language production, specifically in the generation of grammatical structure and verbal articulation. Lesions or dysfunctions in Broca's Area can result in a condition known as Broca's aphasia, in which individuals have difficulty producing words

and sentences correctly, but retain language comprehension. Likewise, this area may experience changes related to normal aging, such as a decrease in verbal fluency and slower verbal processing speed. However, in some cases, older people may experience more pronounced deterioration due to neurodegenerative diseases, such as Alzheimer's disease or stroke. In addition to this area, other brain regions are also involved in language processing such as Wernicke's Area located in the left temporal region, involved in language comprehension. Lesions in this area can result in a condition known as Wernicke's aphasia, in which individuals have difficulty understanding language, although their verbal output may be relatively fluent. The angular gyrus region, located in the inferior parietal region, plays an important role in reading and processing written words. Alterations in this area can lead to difficulties in reading and writing, such as acquired dyslexia (Juncos and Pereiro, 2002).

For these reasons, the article will focus on detailing a cognitive training program specially designed to stimulate language in older adults. The purpose is to foster not only affective communication, brain stimulation and understanding, but also to improve self-esteem and confidence in the participants. In addition, it seeks to reinforce interpersonal communication, promoting group cohesion and creating an environment conducive to the cognitive and emotional enrichment of the older adults involved.

Method

The methodology employed in the creation and development of the language stimulation training program has been based on a sound and comprehensive approach, starting with the review methodology as a starting point. This initial phase, based on the principles proposed by Fernández and Simón (2022), has made it possible to establish a solid theoretical and scientific knowledge base. The primary objective of this review has been to gain a thorough understanding of the fundamentals of language-related cognitive functions, to explore various existing approaches and techniques, and, crucially, to support and justify each strategic choice and activity integrated into the program. The review has not only focused on understanding cognitive and linguistic theory, but also on keeping up to date with the latest research and advances in the field. This has allowed for a more precise application of strategies tailored to the specific needs of the target population, ensuring that the program is not only grounded in theory, but also relevant and effective in practice.

Subsequently, the methodology has been oriented towards the creation and development of program activities. Various educational methodologies have been chosen and combined in order to provide a rich and stimulating learning environment, especially designed for seniors. The expository method was used for the oral explanation of the activities. This approach allows a clear and structured transmission of information, ensuring that participants understand the proposed tasks and their objectives; the interactive methodology has been implemented to encourage active participation and communication among participants. It provides opportunities to express ideas, share experiences and strengthen communication skills in a participatory environment; the inclusion of multisensory learning has been key to activate and consolidate activities through different sensory channels. This approach recognizes the importance of sensory stimulation for effective learning, especially in the context of aging; cooperative learning has been adopted for the joint construction of knowledge. This method not only promotes

collaboration and mutual support, but also contributes to the development of social skills and a sense of belonging.

The use of participatory methodologies has been a deliberate choice to encourage activity and the active construction of knowledge. This approach not only makes learning more meaningful, but also promotes social interaction and intrinsic motivation. Essential aspects for a program designed not only to stimulate language, but also to enhance personal development and promote lifelong learning.

Ultimately, the methodology adopted has not only been comprehensive in its approach, addressing both theory and practical application, but also flexible and adaptive to meet the specific needs of the target population. The combination of educational approaches has resulted in a balanced and holistic program that seeks not only to improve language skills, but also to enrich the learning experience and promote active and healthy aging.

Objectives

The overall objective of this program goes beyond purely linguistic improvement; it aims to cultivate enriching and effective verbal communication specifically tailored to the needs of older adults. The ultimate goal is to design a sequence of activities that not only strengthen language skills, but also act as an essential bulwark against cognitive decline associated with aging.

The program aims to preserve and improve vital cognitive functions, focusing on specific areas of the brain related to language, such as Broca and Wernicke. By addressing language fluency, accuracy and comprehension, the aim is not only to improve the quality of daily communication, but also to prevent the cognitive decline that often accompanies the aging process.

The focus on language fluency and accuracy is not simply a technical exercise; it is aimed at improving participants' social participation. By providing tools for more effective communication, the program seeks to foster more satisfying social interactions. The ability to express oneself clearly and understand accurately contributes to building stronger relationships and active participation in diverse social environments.

The essence of the program lies in its contribution to enriching the quality of life of the participants. Effective communication is fundamental to emotional connection, expression of thoughts, and participation in meaningful activities. By enhancing language skills, the program seeks not only to improve verbal communication, but also to enhance participants' ability to express their needs, desires and experiences, which in turn improves their overall well-being.

This program is not only conceived as a set of exercises; it aims to be a catalyst for active and healthy aging. By maintaining and strengthening essential cognitive functions through language enhancement, we seek to provide participants with the tools necessary to proactively address the cognitive challenges associated with aging. This involves not only maintaining language skills, but also promoting an active and positive attitude towards aging.

Sequence of activities

A well-structured sequence of activities allows for a gradual progression in terms of difficulty and cognitive challenge. Beginning with simpler, more basic activities, it has progressed to more complex tasks as cognitive skills are strengthened. The present sequence of activities not only focuses on improving cognitive functions associated with language, such as Broca's and Wernicke's areas, but is also designed to benefit other key cognitive areas: memory, attention, reasoning and visual-spatial skills.

Initial activities focus on speech production and grammar, working specifically in Broca's areas. These exercises not only improve language skills, but also involve a verbal memory component by recalling and repeating specific phrases. This simultaneous focus on memory and language production lays the foundation for comprehensive cognitive training.

The next phase introduces activities designed to stimulate linguistic creativity. Word games, creating stories, and participating in writing activities not only strengthen connections in Broca's areas, but also engage long-term memory and reasoning. The creative generation of verbal content requires the activation of multiple cognitive processes, thus promoting an overall enrichment of brain function.

Activities aimed at improving language comprehension, focused on Wernicke's region, not only work on the ability to listen and understand, but also involve sustained attention. Attention and working memory are essential for following complex instructions and understanding auditory messages, thus contributing to attention and memory training.

Within the sequence, specific games aimed at stimulating verbal memory are included. Remembering lists of words, associating terms, and engaging in activities that challenge short-term and long-term memory strengthen this key cognitive function. This phase not only improves the retention of linguistic information, but also strengthens the individual's overall memory.

The social component of the sequence, such as group conversations and collaborative writing projects, not only improves language skills in an interactive context, but also stimulates social reasoning. The ability to understand and respond appropriately in social situations is a complex cognitive function that benefits from active social interaction.

In short, this sequence of activities goes beyond language improvement, comprehensively addressing several higher cognitive functions. From speech production to linguistic creativity, attention, memory and visual-spatial skills, each phase of the sequence contributes to complete cognitive training. This holistic approach not only enriches the learning experience, but also provides tangible benefits to overall brain function. The connection and synergy between the different cognitive areas strengthens brain plasticity and promotes active and healthy aging, improving the quality of life of older adults who participate in this comprehensive cognitive training program. Thus, the following table also shows all the aspects mentioned above (see Table 1).

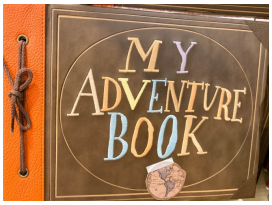
Table 1

Synthesis of the sequence of activities that are developed to work with language

SESSION 1. WORD PORTRAITS: THE ART OF DESCRIPTION.	
Activity 1. The descriptions box.	
Development	Blank paper cards and a variety of everyday objects are prepared in advance. The latter are placed inside a cardboard box and can be random objects such as a watch, a key, a ball, a charger, tweezers, among others.

	Next, each participant takes a paper card and makes a detailed description of one of the objects without mentioning its name. The description should include physical characteristics, functions and any other relevant information. Once everyone has finished writing, the cards are collected and shuffled into the box. Subsequently, participants take turns taking a card out of the box without reading it aloud. Each person must describe the object based solely on the description written on the card. The other participants must try to guess what the object is. The participant who correctly guesses the object wins a point and then the written description is revealed for verification. The activity continues with different cards and objects until everyone has had a chance to describe and guess.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning. • Cooperative learning.
Functions cognitive	• Language. • Attention. • Memory. • Reasoning. • Perception. • Comprehension.
Activity 2. Descriptive challenge: Weaving words through everyday objects.	
Development 	Initially, the game of chain words is used as a reference. Participants must say a word by associating it with an object they have seen or used during that day that begins with the last letter of the previous word. They should also describe the word in as much detail as possible, remembering what it is or what it is used for, the colors, the texture, its usefulness, among others. The objective is to keep the string of words without repetition and to describe the object in question.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning.
Functions cognitive	• Language. • Attention. • Memory. • Reasoning. • Processing speed. • Comprehension.
Activity 3. Painting with words the essence.	
Development 	You will take a box in which you will place small pieces of paper with all the names of the people who are present in the room. Each of them should randomly choose a piece of paper and dive into their imagination to start describing the chosen person in detail. They can use poetic comparisons, metaphors, compare it with a painting, a famous person, a song, among others. The aim is to "capture" the physical traits and internal qualities of the person, such as their character, their passions or their way of relating to others. After an estimated time, participants can share their descriptions with the group. Each one will be able to read his or her 'verbal portrait' and try to convey the essence of the person. Finally, each participant should reflect on the similarities and differences between the descriptions, and appreciate the diversity of perspectives.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning.

Functions cognitive	• Language. • Attention. • Memory. • Reasoning. • Perception. • Comprehension. • Learning.
Activity 4. Lexicon Project: Forging a glossary of unique terms.	
Development	With the help of a basic dictionary, participants have to think of a completely new and original word, with an interesting sonority and any imaginative element. Participants will be provided with poster boards with a template to describe their invented word, along with a drawing and a phrase. This activity can be done individually, in pairs or in small groups to make it a little easier. Once everyone has created their words, a brainstorming session can take place. Each participant will share their invented word and its meaning, and the others will be able to express their impressions or associations with the new word, even combining it with their original idea. Finally, a small dictionary with all the words collected will be made in a cooperative way.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning. • Cooperative learning.
Functions cognitive	• Language. • Attention. • Memory. • Reasoning. • Perception. • Comprehension. • Learning.
SESSION 2. BETWEEN PAGES AND VERSES: A JOURNEY OF WORDS.	
Activity 1. Three landing pages: Write your short story.	
Development	Beforehand, the participants will be explained what a micro-story is, inviting them to participate in the explanation with examples. They will then be invited to embark on an imaginary journey through the writing of a micro-story. They will be provided with three blank pages, representing three different destinations that can be real or imaginary. Participants must choose one of the pages and create a unique micro-story based on the destination they select. Finally, a vote will be held among the whole group to choose which micro-story is the most interesting. This activity encourages creativity and the exploration of different scenarios, allowing participants to freely express their imagination.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning.
Functions cognitive	• Language. • Attention. • Reasoning. • Perception. • Comprehension. • Learning.
Activity 2. Haikus in bloom: Ephemeral poems.	
Development	An explanation of what a haiku is (traditional Japanese poetic form composed of three verses of 5, 7 and 5 syllables respectively). Haikus capture an image of nature and convey an emotion or feeling, which is why each participant is encouraged to choose a theme or an image of nature that inspires them, supported by some photography and even zen music and nature sounds. It can be a landscape, a flower, a season of the year, an animal, among others. Afterwards, each participant must write his/her poetic expression accompanied by a small drawing with the paintbrush, and then share it as a group.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning.
Functions	• Language. • Attention. • Reasoning. • Perception.

cognitive	• Comprehension. • Learning.
Activity 3. Stories in threads of imagination.	
Development 	A deck of cards or a set of cards with various images, such as illustrations, photographs or printed images, is generated. Next, a certain number of cards are selected from the deck (e.g., 5, 10 or 15, depending on the desired length of the game) and the cards are then lowered to be placed face down in a pile in the center of a table. Subsequently, the group determines who is the first narrator of the participants. This can be done by consensus, by turn order or by using any other method such as a die. The opening narrator takes the first card from the pile and shows it to the other players. Using the image of the card as inspiration, the narrator begins to tell a story related to the image, it can be a short story to remember and keep the flow of the game going. Once the storyteller has finished his turn, the player to his left takes the next card from the pile and continues the story, linking his part to the image on the new card. The game continues in this way with each player adding his or her part of the story until an ending (open or closed) is generated. The game should end when all players have had a chance to narrate.
Methodology	• Interactive methodology. • Multisensory learning. • Cooperative learning.
Functions cognitive	• Language. • Attention. • Memory. • Reasoning. • Comprehension. • Perception. • Learning.
SESSION 3. WEAVING THE STORY OF A LIFE.	
Final product. Portraits of a life: Treasures of experience.	
Development 	This activity gives them the opportunity to collect and share their memories, experiences and reflections in a meaningful and tangible way. To this end, the idea of creating a memory book or life album where they can record their personal stories and experiences will be explained to each participant beforehand and they are encouraged to reflect on the most important moments of their lives, their goals, achievements, lessons learned and significant memories. They are also provided with a template as a basis and support with some questions, allowing them to write their story. For this process, several group writing sessions are also held where they share and discuss their life experiences, using descriptions, detailing emotions and personal anecdotes to enrich the writing. If some participants have difficulty writing, a writing partner or encouraging oral storytelling is offered as an additional support network. This will depend on the characteristics of the user. Therefore, participants are asked to provide family photographs, printed images or magazine clippings, among others, that represent important moments in their lives. You will be helped to organize and select the most relevant and meaningful images to include in the memory book or life album, in a coherent and attractive way. Finally, an open day is held for each participant to share their life album with their family, friends, partner, or other interested users so that they can be part of this very special event.

	This activity is the finishing touch to the sequence, since it will not only stimulate language in the elderly, but will also give them the opportunity to reflect on their lives and create a meaningful space to share with their loved ones.
Methodology	• Expository method. • Interactive methodology. • Multisensory learning. • Cooperative learning.
Functions cognitive	• Language. • Attention. • Memory. • Processing speed. • Comprehension. • Reasoning. • Perception. • Learning.

Note. Authorship (2023). This table shows a small cognitive training program for the stimulation of language and other cognitive functions that work with older adults. The images used are in the public domain.

Resources and materials

Regarding resources and materials for the training program, a careful selection has been planned to support the diversity of activities and goals established. Cardboard boxes, paper cards, writing materials, handouts and templates for writing and organizational activities will be included. The use of dictionaries, poster boards and photographs will provide visual support, stimulating comprehension and memory. The integration of computer equipment and microphones will facilitate multimedia and speaking activities. Artistic painting materials and binding cords or rings will be used for creative projects, encouraging artistic expression.

In addition, visual cards, printed images and magazine clippings will be used to stimulate the association of ideas and promote conversation. Printed copies of the participants' album will not only serve as a tangible record of their progress but will also facilitate reflection and sharing of experiences. Special attention will be paid to the ambience, incorporating decoration and elements that create a pleasant and comfortable environment for the participants.

It is essential to emphasize that flexibility is key in adapting these resources and materials. They will be adjusted according to the individual characteristics and preferences of the participants, ensuring a personalized experience focused on their needs. This approach ensures that the resources are not only effective pedagogical tools, but also facilitators of an inclusive and enriching learning environment.

Evaluation

The evaluation of the sessions and the sequence of activities is an essential component of the program, adopting a comprehensive approach that employs a variety of methods and tools to obtain a complete understanding of the results. The implementation of diverse evaluation approaches not only captures the richness and complexity of participants' experiences, but also facilitates the identification of areas for continuous improvement. How each method contributes to the holistic evaluation of the program is detailed here:

A) The qualitative evaluation is carried out through individual interviews with the participants, establishing a direct channel to collect their impressions, feedback and suggestions for improvement after each activity. This approach provides valuable *insights* into participants' subjective perception, their level of satisfaction and the specific areas they find beneficial or challenging. The interviews not only

capture quantitative data, but also reveal qualitative aspects of the experience, thus enriching the overall understanding of the results.

B) The evaluation of results is carried out through the individual activities proposed, such as the creation of a personal dictionary, the composition of micro-stories, the elaboration of haikus and the construction of a life album. Specific criteria such as relevance, narrative, organization and presentation of these creations are considered. This approach allows not only to evaluate the acquisition of language skills, but also to understand creativity, personal expression and the ability to apply what has been learned in concrete contexts.

C) The overall evaluation focuses on the achievement of the established objectives, the participation of individuals, the results obtained and the general feedback. This approach provides a panoramic view of the program's performance, making it possible to identify areas of success and those in need of adjustment. Overall feedback from participants, along with the quantitative data collected, helps to adjust and adapt the sequence of activities to maximize the effectiveness of the program over time.

D) Continuous evaluation emerges as the main option, carried out constantly throughout the activities and the project. This approach promotes learning and continuous improvement in a dynamic way. Feedback and observations are integrated into the process, allowing immediate adjustments to address challenges and optimize the learning experience. Continuous evaluation is not only a measurement tool, but also an active component that drives the constant evolution and adaptation of the program.

To carry out this comprehensive evaluation, various instruments are used, such as direct observation, evidence recording, verbal feedback, self-evaluation, learning diaries and short questionnaires. These instruments are implemented in a flexible manner, using supports such as sheets of paper, portfolios, rubrics and physical diaries, always adapting to the needs and context of the activity. This variety ensures that multiple dimensions of the learning experience are captured, allowing for a more complete and accurate assessment.

Overall, this comprehensive evaluation strategy contributes significantly to the effectiveness and adaptability of the program. The combination of quantitative and qualitative methods, together with the implementation of a variety of instruments, ensures a thorough and holistic assessment. Continuous feedback and the ability to adjust in real time allow the program to evolve according to the individual needs and experiences of the participants, thus ensuring its relevance and effectiveness over time. This careful attention to assessment reflects the program's commitment not only to the improvement of language and cognitive skills, but also to the holistic and unique experience of each participant.

Results

The diversity of objectives set out in this program translates into a comprehensive range of desired outcomes. This ambitious initiative not only aims to improve language skills, but also to strengthen verbal memory, positively impact emotional and social well-being, and address cognitive decline associated with aging. Here, we will detail in more detail how these objectives materialize into a wide variety of concrete benefits.

The core of the program is focused on the significant improvement of language skills. This covers essential aspects such as comprehension, oral expression, reading and writing. The goal goes beyond a simple increase in vocabulary; the aim is to promote verbal fluency and communication skills. The implementation of specific strategies, such as speaking exercises, reading aloud and writing activities, will contribute to a tangible increase in the effectiveness of daily communication.

The integration of language into cognitive training not only aims to improve language skills, but also has a direct impact on verbal memory. Participants will be guided through exercises designed to retain and recall critical information, details of conversations, words and instructions. This approach not only benefits verbal memory, but also stimulates other cognitive functions such as attention and reasoning, demonstrating the vital interconnection between language and cognitive functioning.

The program is not limited to cognitive improvements; it also seeks to generate a positive impact on the emotional and social well-being of the participants. Improved language skills, especially in oral expression and participation in meaningful conversations, are expected to contribute to an increase in self-esteem. The ability to communicate effectively can have a transformative effect on social relationships, fostering deeper and more satisfying connections.

The anticipation of a positive impact on self-esteem and social participation goes hand in hand with the vision of the program as a catalyst for more active and fulfilling aging. By providing tools for more effective communication, we seek to empower participants to participate more fully in social, cultural and community activities. This holistic approach not only benefits mental and emotional health, but also contributes to a positive perception of aging.

Specific attention to the regulation of cognitive decline associated with aging reflects the program's commitment to keeping the brain active and reducing the risk of neurodegenerative diseases. The combination of activities that challenge memory, attention and reasoning, along with the focus on language skills, creates an environment conducive to neuroplasticity and long-term brain health.

It is imperative to point out that, although these results represent ambitious goals, individual variability is recognized as a determining factor in the materialization of these benefits. Each person has unique needs and capabilities, and the effectiveness of the program is intrinsically linked to their adaptability. Understanding this diversity underscores the importance of tailoring strategies according to individual characteristics, thus maximizing the effectiveness of the program for each participant.

Discussion and conclusions

Adaptability and customization have emerged as crucial elements during the design and implementation of this program. The most important observation is the need to adjust the activities to the individual characteristics of each participant, recognizing the diversity of linguistic and cognitive skills present in the group. The importance of a thorough initial assessment proves to be an essential step in identifying specific areas that require further attention and a personalized approach.

The provision of continuous support and positive feedback proves to be a key component in the process. Creating a motivating and supportive environment contributes

significantly to maximizing results by encouraging participants to overcome challenges and advance their linguistic and cognitive development.

The inclusion of a variety of activities designed to stimulate various aspects of language: reading, writing, interacting and listening are strategically incorporated to comprehensively address language skills. This diversity of approaches provides a comprehensive framework for cognitive and linguistic development, offering a wide range of stimuli that benefit participants.

Gradual progression, starting with simpler activities and moving towards more complex ones, has been shown to be an effective strategy to ensure a smooth and adapted learning experience. This approach allows participants to progress at their own pace, ensuring that each step is an achievable and, at the same time, meaningful challenge for their development.

The program seeks not only to offer short-term benefits in terms of language and communication improvement, but also to generate a long-term impact on the cognitive health and quality of life of the participants. By cultivating richer and more effective communication, participants are expected to experience greater satisfaction in their daily interactions and maintain an active and resilient mind as they age.

In line with the words of the Italian neurologist Rita Levi-Montalcini (2022): "Keep your brain excited, active, make it work and it will never degenerate" (para. 2), the program is aligned with an active and committed approach to healthy aging. Providing seniors with meaningful opportunities to participate in a variety of activities promotes a higher quality of life, autonomy and independence. The philosophy of keeping the brain excited and active reflects the spirit that drives this program, where learning and cognitive stimulation are intertwined to cultivate full and healthy aging.

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THINKING ROUTINES IN VIDEOGAMES AND PROJECT-BASED LEARNING IN SECONDARY SCHOOL

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Abstract: Nowadays, videogames have been treated as the antithesis of learning, considering them as a challenge rather than an opportunity. That was why, the project was made to have a common point between the motivation provided by video games and an educational context that Project Based Learning with the Thinking Routines gave us. Moreover, the project was designed for the 2nd year of Secondary school. The project based on pandemics that happened and percentages to design the videogame. Also, each phase of the PBL had its routine for data analysis, encouraging students to do cognitive thinking at the same time. Due to the COVID-19 pandemic, Results has been changed to a hypostatization. Not only was each phase of PBL with its routine do, but also the apk of the developed video game was made as a simulation of what a class could generate or answer. Taking everything into consideration, the project provided us different conclusions to think about: the intrapersonal factor in the creation of the project, the importance of the interconnection of the PBL, the approach to reality provided by the PBL, the importance of diversity of thinking, the motivational factor of the video games and the synchronization between the PBL and the thinking routines.

Keywords: Thinking routines, Videogames, Project Based Learning.

APLICACIÓN DE LAS RUTINAS DE PENSAMIENTO EN LOS VIDEOJUEGOS Y EL ABP EN LA EDUCACIÓN SECUNDARIA

Resumen: En la actualidad, los videojuegos han sido tratados como la antítesis del aprendizaje, considerándolos más como un desafío, en vez de una oportunidad. Por ello, se ha buscado un punto de encuentro entre la motivación aportada por los videojuegos y un contexto educativo formado por el Aprendizaje Basado en Proyectos junto a las Rutinas de pensamiento. Para ello se diseñó una programación para el 2º curso de Educación Secundaria Obligatoria, basada en la elaboración de videojuegos como proyecto, cuyo tema fue las pandemias que han surgido en la historia y los porcentajes. Teniendo cada fase del ABP su rutina correspondiente para el análisis de datos, buscando a su vez fomentar el ejercicio de razonamiento en el alumnado. Debido a la pandemia COVID-19, se ha llevado a cabo un supuesto del apartado "Resultados", en vez de su propio procedimiento, desarrollando cada fase en su totalidad, así como un producto final. Generando cada rutina de pensamiento y el apk del videojuego desarrollado.

Desembocando en el factor intrapersonal en la creación del proyecto, la importancia de la interconexión del ABP, el acercamiento a la realidad aportada por el ABP, la importancia de la diversidad de pensamiento, el factor motivacional de los propios videojuegos y la sincronización entre el ABP y las rutinas de pensamiento.

Palabras clave: Rutinas de pensamiento, Videojuegos, Aprendizaje Basado en Proyectos.

Introduction

Video games are a very present source of entertainment nowadays, not only because of the time spent on them, but also because of the large number of events focused on them.

Unfortunately, video games have been treated as the antithesis of learning. Moreover, in some approaches to the educational field, they have resulted in a distancing of the youth audience, due to the misconception that the words video games and education are incompatible.

At the same time, it should be noted that video games need an educational context to give them that didactic quality. In order to bring this meaning to video games, the innovation project focused on a combination of project-based learning and the use of thinking routines.

It is important to contextualize the situation in which this project has been carried out. Because of the state of forty due to the COVID-19 pandemic, an assumption of the "Results" section has been carried out, instead of its own procedure.

Before starting, in order for the student to acquire an internalization of the contents that culminates in meaningful learning, it is necessary to first define those concepts that are included in this procedure. According to Swart *et al.* (2013), for the thinking process, the following terms should be considered:

- Knowledge: the ability to recall specific and general facts without any applied changes any applied change.
- Comprehension: the incorporation of knowledge or ideas perceived in their totality totality.
- Analysis: process of breaking down a problem for its future resolution.
- Synthesis: process of combining various elements into a single mental structure mental structure.
- Infusion: a process of merging the various techniques to bring thinking into the classroom into the classroom.
- Thinking skills: process that employs reflective procedures, in order to perform a given thinking exercise in order to perform a specific thinking exercise.
- Habits of mind: process focused on reflective behaviors through routine procedures routine procedures.

In addition, it is necessary to consider the different learning strategies, which, according to

Valle *et al.* (1998) are:

- Cognitive strategies: which focuses on the incorporation of new knowledge with previous knowledge knowledge with previous knowledge. Supported by strategies of

repetition, elaboration and organization.

- Metacognitive strategies: based on the assessment of the learner's own cognition of the student himself.
- Resource management strategies: which focus on supporting different types of resources that contribute to task resolution types of resources that contribute to task resolution.

On the other hand, in order to achieve meaningful learning, it is necessary to take into account the agents involved in the student's learning process: the teacher and the student.

Palma *et al.* (2017) state that the teacher is an active processor of the information provided by the context, manipulating it through their cognitive skills to perform a reflective analysis of it, to then transport it to the classroom.

Therefore, meaningful learning is based on teaching practice, which, according to García *et al.* (2008), is understood as the set of actions within the classroom, determined by the teacher's intervention before, during and after an activity, which leads directly to student learning. Continuing with the other agent, the student is characterized by his role as an alchemist, being the active participant in the activities proposed by the teacher.

But in order to maintain the intervention of the students, it is necessary to take into account the motivation of the students. According to Gee (2004 cited in Bosco *et al.* 2017), young people allocate several hours of their time to video games, due to a great motivational potential. Also, according to Bosco *et al.* (2017), thanks to video games it is possible to transform tedious learning into interesting learning.

Likewise, according to Sampedro Requena and Mcmullin (2015), as a result of the attractiveness of the use of video games and digital games, greater student participation is achieved.

Furthermore, according to Méndez and Del Moral (2017), implicit learning is enhanced by video games, thanks to their attractive formula for the exercise of cognitive skills from different fields (observation, memory, problem solving, etc.), as well as catalysts of learning processes and learning contexts themselves.

Likewise, it is important to highlight the origin of video games, being the game itself, called by Mora (2013), as an instrument invented from the nature of the child with continues to acquire learning and reaches skills and abilities efficiently, achieving a more effective adaptation to the world around him.

In turn, it is important to highlight the term Serious games, which according to Méndez and Del Moral (2017), are those video games created with a clear educational purpose, currently used in different areas (companies, schools, universities, etc.), both to promote the development of specific skills and abilities, as well as to stimulate creative thinking processes, reasoning or problem solving.

However, some Serious games do not reach all educational demands, according to Dorado and Gewerc (2017), this is due to the lack of communication between video game development companies and the educational context, the poor ability to adapt to the environment or the low relevance of the perceived contents for the teaching and learning process of the student.

In addition, it is important to highlight the benefits of using video games in the classroom, according to Del Moral *et al.* (2015) are:

- Thanks to the video games, the student achieves a high level of development in high levels of of significance by achieving a concordance with their own interests,

producing an effective didactic tool.

- The very interactivity that a video game achieves and the time it takes to play it

development resulting in the integration and engagement of the learner in the imaginary context produced from their own stories and actions.

- It makes it possible to train individual and personal skills, as well as the existence of some kind of monitoring and progress of some type of mechanism for monitoring and progress of the students by the teacher by the teacher.

- A self-evaluation of the different processes and strategies implemented is carried out strategies put into play.

Also, from a technological point of view, in the Spanish educational field, technologies are an important point at the curricular level, not only because of the BOE (digital competence), but also because of the different programs that support them:

- The Medusa Project: seeking to provide computer resources to all educational centers and to offer training to teachers, trying to and offer training to teachers, trying to achieve the main educational objectives educational objectives. (Area, 2009)

- The School 2.0 program: focused on the configuration of media (hardware, software and special (hardware, software and special interfaces) for the classroom and the technological implementation of technology, both formative and structural, in the center the center. This program is not currently in force, but nevertheless, it was the precursor of the advances in technological education of the following autonomous communities, these are: Andalusia, Aragon, Asturias, Cantabria, Castilla y León, Castilla La Mancha, Cataluña, Galicia, Extremadura, Balearic Islands, Canary Islands, La Rioja, Navarra, Murcia, Basque Country, as well as in the

autonomous cities of Ceuta and Melilla. (Area *et al.*, 2014)

The root of this, according to Parra *et al*. (2014), is that students who use computers achieve faster learning, reflecting more positive attitudes toward the courses.

In addition, ICTs make classroom activities more dynamic, helping students to develop fundamental competencies for effective and adequate performance in personal, social and work-related fields.

In agreement with Nuñez *et al*. (2015), the advantages of using ICT are:

- Encourage creativity.
- Increase the information available.
- Provide research activities.
- Versatile use of information
- Attracting students' attention

Also, according to Area (2009), students are more accustomed to the use of technologies than teachers, due to the fact that these technological tools are part of the students' own generational identity.

This makes it evident that students are more easily able to handle technologies and have clear digital competencies, and it is inconsistent to keep them away from these deep-rooted skills.

Parra *et al.* (2014) point out that success in the application of ICT in curricular plans is conditioned to new approaches that teachers make in their daily work, but with a traditional and rigid thinking, the implementation of this pedagogical alternative will surely not reach the desired goal.

Taking into consideration the above aspects, it can be assessed that the use of video games in the classroom is a driver for students to achieve meaningful learning.

Even if there is a motivational aspect, without a solid educational method, meaningful learning will not occur in the students.

Therefore, we are now going to look at project-based learning, emphasizing its link with constructivism. Emphasizing the relevance of action in student learning and, in addition, focusing on the student's protagonism in the process of his or her own learning.

According to the Spanish Ministry of Education, Culture and Sport, project-based learning is defined as: "a methodology that allows students to acquire key knowledge and skills in the 21st century through the development of projects that respond to real-life problems." (2015, p10)

In turn, according to the Spanish Ministry of Education, Culture and Sport (2015), a project is considered suitable when it incorporates the following elements:

- Meaningful content
- The need to know
- The research question
- Student voice and vote
- 21st century competencies
- Research leading to innovation
- Evaluation, feedback and review processes
- Exposure of the final product to an audience

In addition, project-based learning values the roles of the learner and the teacher in the learning process. According to González *et al*. (2017), students and teachers are defined as:

Student

- Holder of the content and the objective.
- Employ a real assessment.
- The teacher is a facilitating companion.
- It has explicit educational goals.
- The use of constructivism to strengthen their mental maps.
- The teacher also learns from the student.

Teacher

- Focused on the student and promoting intrinsic motivation.
- Promotes autonomous, collaborative and cooperative learning.
- Seeks continuous improvement in its products for learners, presentations or performances.
- Their role is focused on the student being actively engaged in the solving real and authentic problems.
- Requests a product, presentation or performance from the student.
- It is focused on the development of higher order skills through a critical approach critical approach.
- Transfers what has been learned to new situations.
- Encourages scientific inquiry, discovery and satisfaction from knowledge accumulated.

Continuing with the theme, a convenient tool for project-based learning are learning routines, which according to Pinedo *et al*. (2017, p.2) indicate, thinking routines can be defined as: "specific tools to aid thinking; structures with which students can explore and discuss knowledge; and aids to encourage thinking, the use of reason and reflection."

This is why the use of thinking routines and project-based learning is so valuable with the use of technology, since, thanks to its orientative nature and constructivist basis, meaningful learning can be achieved, supported by the motivation and versatility provided by the technological domain.

Taking into consideration the different points discussed, thanks to the educational basis provided by PBL, together with the structuring of thought offered by thinking routines, added to the motivational factor of video games, it is possible to achieve significant learning by students.

Method

The project focuses on the creation of video games based on thinking and the organization of ideas, through a series of thinking routines, whose objective is to "Learn to think" and connect in a more effective way the knowledge taught in the classroom.

Being under the approach provided by project-based learning (PBL), typical of the center where this innovation project would have been developed. This method focuses on the acquisition of knowledge and skills by students through the development of projects that respond to real-life problems.

This study would have been put into practice during the subject of Mathematics in the 2nd year of Compulsory Secondary Education, whose content to be worked on would have been percentages and pandemics that have occurred in history. In turn, it would have been carried out in other classrooms and subjects to have other perspectives, since the creation of video games is a tool that brings benefits in any subject, due to the fact that, in all subjects of compulsory primary education, motivation, thinking and reasoning should be prioritized as a bridge between the various concepts that are worked on in the classroom.

The main benefit is the ease with which the proposed activities enable students to concentrate on ordering their ideas and newly acquired knowledge, assimilating the new information in their mind map. In addition, it favors the practice of critical thinking at each stage.

Linked to the previous point, by practicing critical thinking, students will not allow themselves to be manipulated by other thoughts that are alien to the democratic ethical-moral bases that are worked on in schools, making them free entities with the ability to contrast other ideals.

At the same time, the union between the concepts taught and the current culture of the students is achieved, resulting in a distancing from the feeling of alienation that is currently very present in the classroom, seeking to conceive these two elements as one.

This project would have been aimed at students in the 2nd year of secondary school at IDEO SCHOOL, the age of these children is between 13 and 14 years old.

It should be noted that students in this time period are characterized by (Marina, 2019):

- The labeling of their parents and the teacher as an authority figure within their respective contexts.
- The valuation of their own siblings as a commanding authority.
- The consideration of their own friends as figures of dominance.
- The capacity for positive self-criticism through humor.
- The development of rebelliousness against authority, due to fear of maturity and the acquisition of new responsibilities, as a result of attachment to their childhood.
- The absence of the authority figure due to their own egocentrism and other act of previous rebellion.
- Membership in the iGen (the generation of students born at the same time of development of the Internet), being educated for their growth in society digital.

In turn, for this project, the objectives to be achieved are:

- Use logical reasoning to solve problems similar to your own Future working life.
- Apply the use of ICT for the acquisition of work-focused habits individual and teamwork, based on effort and responsibility in the study.
- Discovering their own potential, through autonomous work, leading to in self-confidence and self-satisfaction for the achievements made

individually and collectively.
- To value the different attitudes and aptitudes of each individual for the distribution of tasks.
- To use video games as a motivational means for the creation of contents.

For its development, each phase involved in the Project Based Learning method would have been covered:
- Initial question: in this section you will find the question to be answered and those routines of thought whose the objective is the activation of knowledge.
- Collaborative team building: in this section, the teams are defined as follows and those thinking routines whose purpose is the comprehension of the aptitudes and attitudes of individuals.
- Definition of the final challenge (with ICT): at this stage, the product to be produced is specified and those thinking routines whose objective is to facilitate this process specification.
- Organization and planning: this period includes the allocation of and the definition of tasks and those routines of thought whose purpose is the visualization of the planning.
- Search and collection of information: this phase is where the process of and those thinking routines whose objective is the collection of materials and those thinking routines whose objective is the source filtration.
- Analysis and thesis: in this section we find the contrast of information and the those thinking routines whose purpose is the comprehension of knowledge.
- Workshop and production: in this section, the application and development of the and those thinking routines whose objective is the elaboration of a project and those thinking routines whose objective is the elaboration of a project Contents.
- Presentation of projects: at this stage, the presentation of the project is developed product and those thinking routines whose purpose is to facilitate the understanding of the characteristics of the result obtained.
- Collective answer to the initial question: this is the period in which the conclusions reached and those thinking routines whose objective is the understanding of knowledge.
- Evaluation and self-assessment: this phase reflects the self-reflection of the work done and those thinking routines whose purpose is the evaluation of of knowledge.

In order for students to develop their own video games, the use of the Gdevelop program is proposed. This is a video game generator program, focused on 2D video games, with programming based on action and consequence. At the same time, this tool allows the creation of mobile games, promoting the public factor of the final product, a characteristic concept of PBA.

In addition, a support web page was developed (https://sites.google.com/view/manual-gdevelop/página-principal), to review or expand their knowledge, which includes video tutorials and images of the commands, the latter being the most complex part of the development of the project.

It also offers a creative point for the design of your video game, by

the Piskel tool, focused on pixel art-based graphic elaboration, allows students to elaborate their own sprites without the need for high artistic skills.

The development of each PBL stage for the elaboration of the video game with its respective thinking routine is detailed below. The latter is our evaluation instrument, providing us with the data to be analyzed in order to verify its effectiveness.

Because, thanks to the thinking routines, it is possible to capture the different reasoning processes of the students, observing the relationship between the different ideas or concepts that they themselves generate.

Initial question

At this stage, the initial question, "How to control future pandemics through mathematics?" would have been presented through the "Timeline" thinking routine, taking a tour of the most important pandemics in history. Similarly, the "Rubric" thinking routine would have been offered and the first part of the "Did I used to think?" routine would have been done now I think?" for future phases.

At the same time, there would have been an introduction to the elements of Gdevelop, focused on the first steps for the development of the video game, the explanation of the buttons and the positioning of the camera.

Collaborative team building

During this phase, the idea was to form the work teams by means of the "Test" thinking routine, whose objective is to level the groups by means of a series of questions on the subject to be dealt with.

In addition, an input to the design of the sprites to be used would have been carried out using the Piskel tool.

Definition of the final challenge (with ICT)

In the course of this section, the category to be chosen in the universe of video games would have been defined using the "Hand Model" routine, whose purpose is to choose the genre of video games most in line with the written answers. Emphasizing the issues to be addressed with respect to the subject of Mathematics.

In addition, a lesson focused on the animations of the characters that will take part in the video game was also planned.

Organization and planning

Throughout this session, the distribution of tasks and the steps to be taken to achieve the proposed objective would have been discussed. The thinking routine to be used would have been "Kanban", with the objective of graphically capturing the evolution of the video game.

Likewise, a class oriented on the movement of the characters themselves would have been carried out.

Search and collection of information

During this period it was planned to carry out the information gathering process for the context and history of the video game, by means of the "Reliability of sources" thinking routine, whose purpose is the debugging of contents for a better contextualization.

Likewise, the steps to follow for the structuring of the movement and damage commands of the enemies in the videogame were also explained.

Analysis and thesis

During this stage he would have focused on defining the context and the story, through the "Compare and contrast" thinking routine, managing to synthesize the information collected from the previous phase.

Also, training was planned for the input of commands in the platforms, developing mobile platforms for later use in the video game.

Workshop and production

In the course of this phase, the development of the video game would have begun, using the "Generate-classify-connect-elaborate" thinking routine, to concretize the cohesion between the elements.

And using the "Storyboard" routine in order to capture the continuity to be followed by the production.

At the same time, an introduction would have been made to the scene change, the pause button and the protagonist's life bar.

Presentation of projects

Throughout this section, the results obtained by the teams would have been presented. Although the teams would not have had a fixed method of exposure, the "Gameplay" thinking routine would have been recommended for a better visualization of the video game and the concepts to be conveyed.

No explanation of the program would have been given in order to focus on the exhibits themselves.

Collective answer to the initial question

This session would have answered the initial question of "How to control future pandemics through mathematics?", using the Lino tool, in turn it was intended to complete the thinking routine that "Did you used to think?" now I think?" with the objective of contrasting what has been learned and responding with solid arguments on the topic to be discussed.

In addition, a lesson would have been given on the configuration of the video game to the field of mobile devices.

Evaluation and self-evaluation

During this stage it was intended to assess the results obtained by the students, and the "Rubric" thinking routine, offered at the beginning, would have been used to base this estimation of knowledge.

In addition, there would have been a class focused on the export of the video game.

In addition, for the project to meet its objective, it must have continuity, so a timeline (Table 1- Project timeline) was drawn up for one school term, focused on the creation of video games in the classroom, covering the following sections: dates, PBL phases, thinking routines, video game development and explanation of the program.

Table 1

Project Timeline

		1st Quarter		
Date	PBA Phase	Routine of thinking	Development of the video game	Explanation of Gdevelop
September 15 (50 min)	Ask initial	Timeline (5 min) "Did you used to think? now I think?"	Ask about The video game (5 min)	Introduction from the elements of Gdevelop (First steps, buttons

		(5 min)		and camera)
	Formation of team collaborative	Test (10 min)	Creation from equipment work (5 min)	y entrance to the design of sprites with Piskel (20 min)
September 29 (50 min)	Definition of final challenge (with ICT)	Hand Model (10 min)	Concretization of the subject of the video game (5 min)	Explanation of the animations y configuration of the protagonist (Movement) (15min)
	Organization and planning	Kanban (10 min)	Timeline and distribution of tasks (10 min)	
October 6 (50 min)	Search and compilation of information	Reliability of sources (15 min)	Process of collection of the context of the video game (20 min)	Structuring of the commands of enemies (Movement and damage) (15 min)
October 20 (50 min)	Analysis and thesis	Compare and contrast (10 min)	Process of study of the context of the video game (25 min)	Training in the commands for the platforms (Static and cell phones) (15 min)
November 10 (50 min)	Workshop and production	Generate-sort-connect-elaborate (10 min) Storyboard (10 min)	Generation of the video game (20 min)	Entrance to the parameter of life of the protagonist (10 min)
December 1 (50 min)	Presentation of projects	Gameplay (15 min)	Exposure of the video game (15 min per group)	Presentation of the project
December 15 (25 min)	Reply collective to the initial question	used to think? now I think? (10 min)	Sharing of the results obtained (10 min)	Configuration of the video game for devices mobiles y explanation of export of the game (10 min)
	Evaluation and self-evaluation	Heading (10 min)	Verification of the contents acquired (10 min)	

Results

Unfortunately, due to the COVID-19 pandemic, it was not possible to carry out a practical implementation, so a project assumption was made, developing each phase until the final achievement of the objective, being the video game apk.

(https://drive.google.com/file/d/19tbGdowx5BF122DBCQ_oQzyVnF34JYD/view?usp=sharing)

Initial question: in the course of this session, the initial question would have been presented through the "Timeline" thinking routine (Figure 1- Timeline thinking routine), making a tour of the most important pandemics in history. In addition, they would have been offered the "Rubric" thinking routine (Figure 13- Rubric Thinking Routine) and planned to perform the first part of the routine "Did I used to think?" now I think?" (Figure 2- Thinking routine Did you use to think? now I think?) for future phases.

Figure 1

Timeline thinking routine

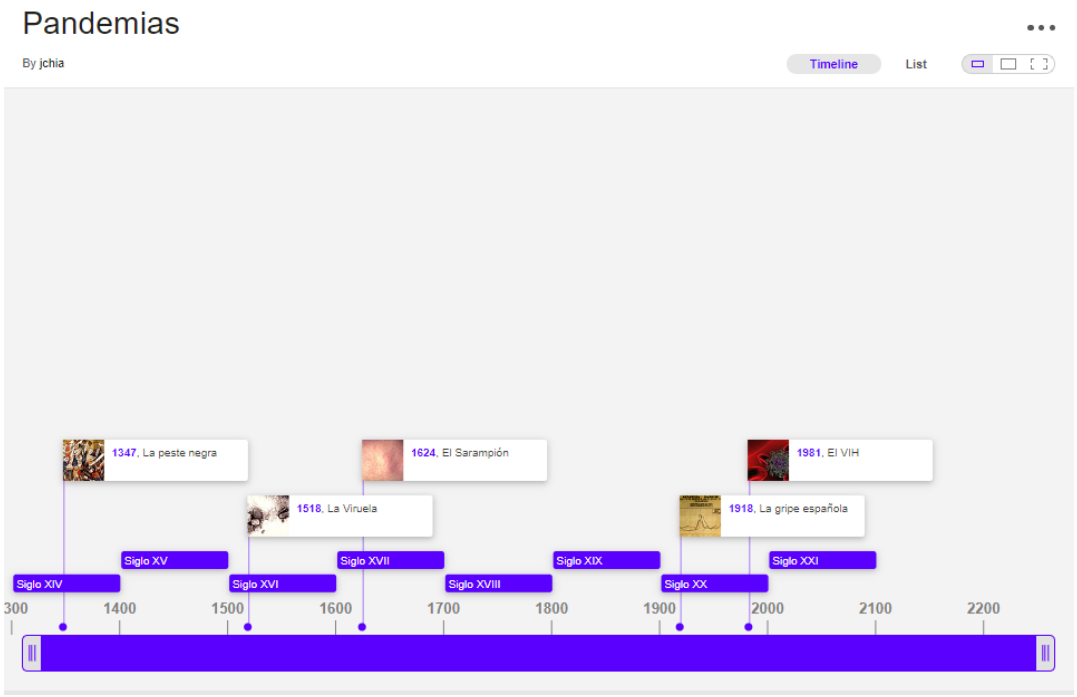
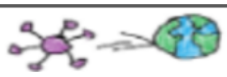


Figure 2

Thinking routine Did you use to think? now I think?

Solía pensar... Ahora pienso...

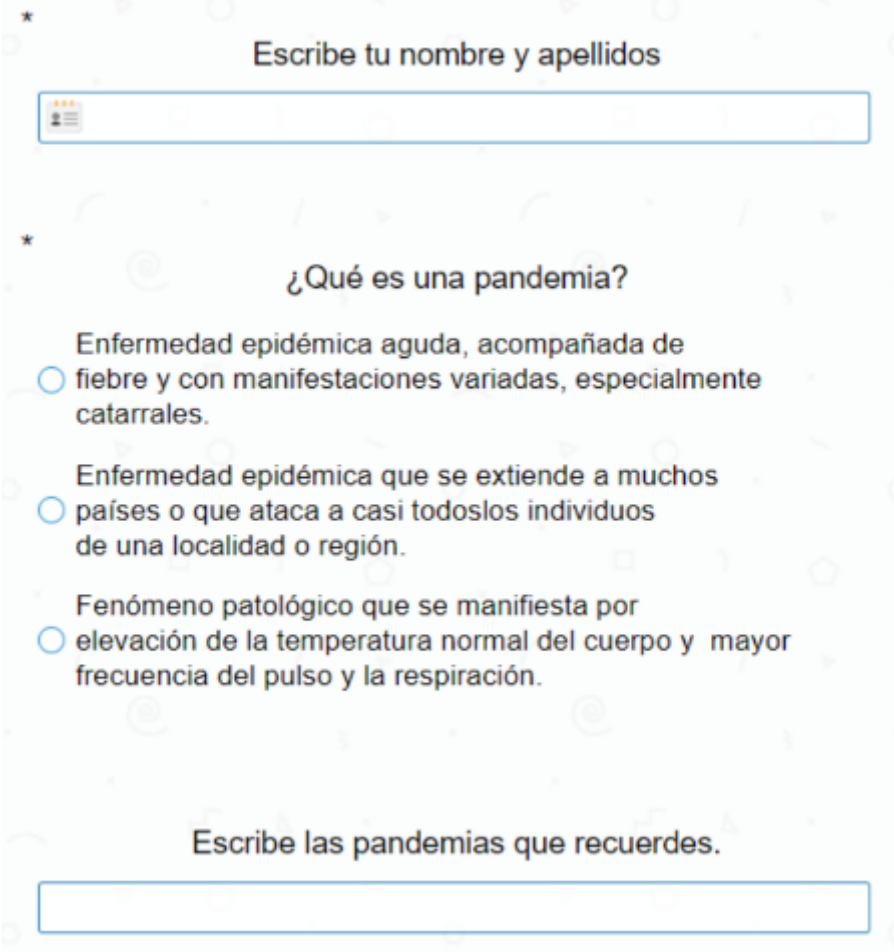
Nombre: Juan José Torres	Tema: Las matemáticas y las pandemias
Solía pensar...	Ahora pienso...
La pandemia es una enfermedad a nivel global. El coronavirus es una pandemia. Dibujo 	Dibujo
Mi pensamiento ha cambiado debido a:	

Thanks to these implementations, students would have been aware of their own prior knowledge and would have appreciated the importance of the historical journey, conceiving history as a way to take advantage of it in order to avoid previous mistakes.

Collaborative team building: during this stage, working groups would have been formed by means of the "Test" thinking routine
(Figure 3- Routine Thinking Test), seeking to create balanced teams.

Figure 3

Thinking routine Test

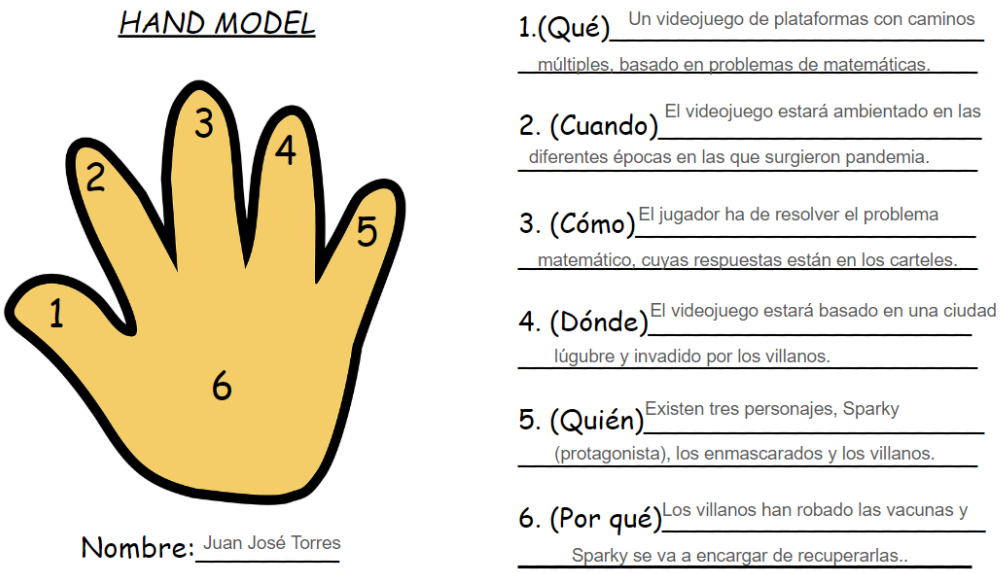


As a result of this activity, the students would have obtained equipment with greater diversity, gaining the opportunity for a learning cooperative, with the more advantaged students helping those who have more difficulties with the subject matter.

- Definition of the final challenge (with ICT): in this section, the groups should have chosen the category of their videogames, using the thinking routine "Hand Model" (Figure 4- Hand Model thinking routine). Highlighting the topics to be addressed with respect to the subject of Mathematics.

Figure 4

Hand Model Thinking Routine

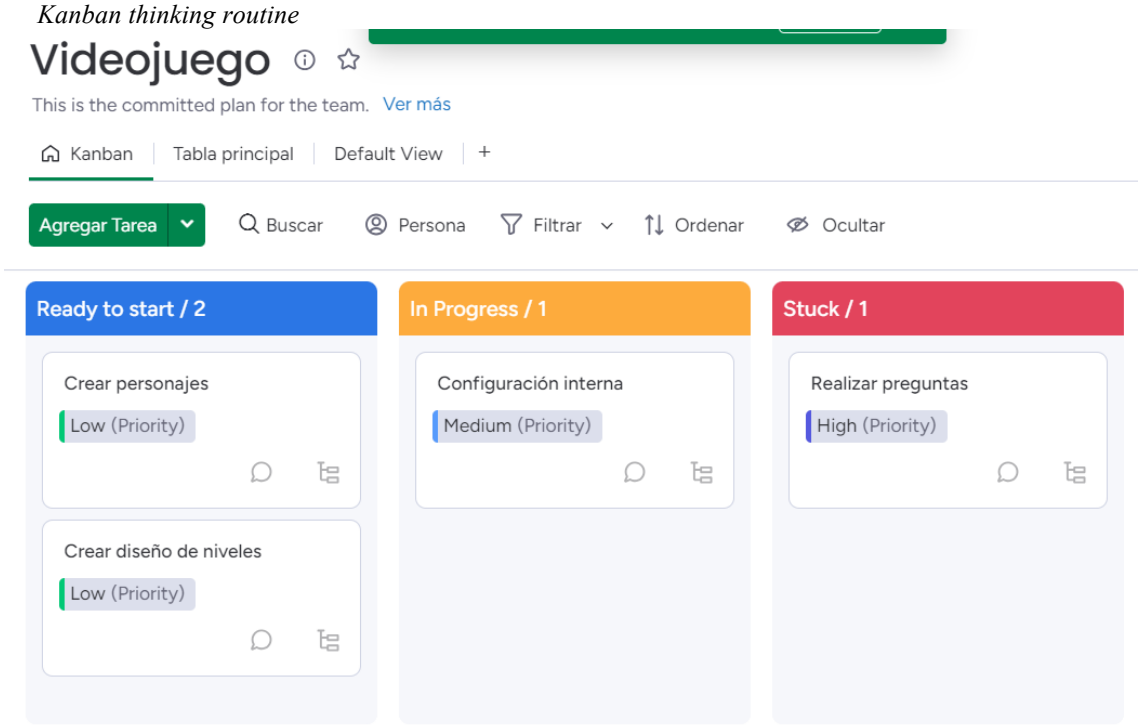


Since the points to be addressed have been determined, the team would have
clear objectives to be achieved, having a better management in their realization, avoiding change in the middle of the process and project delay.

- Organization and planning: during this period, it was thought that the teams would
will carry out their approach to the work, relying on the routine thinking "Kanban" (Figure 5- Kanban thinking routine).

Figure 5

Kanban thinking routine

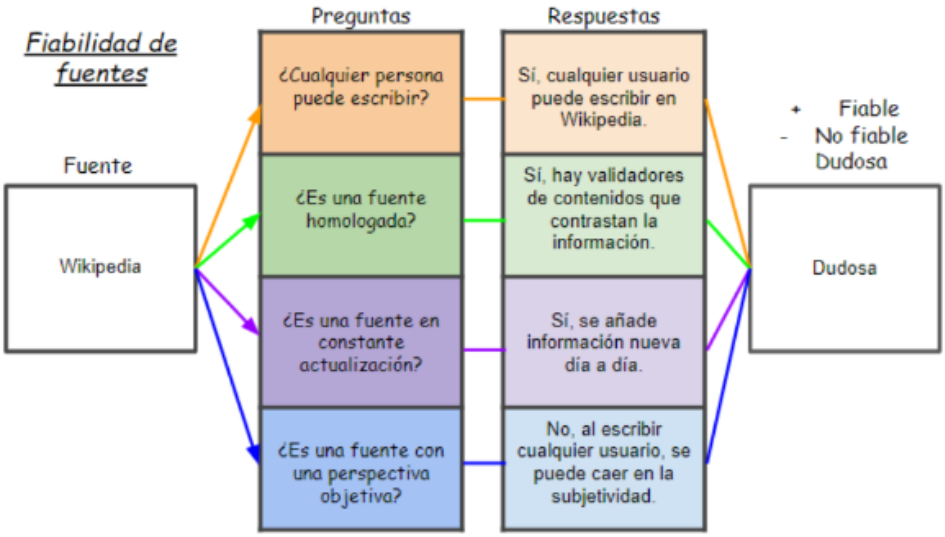


Due to a visual organization of the tasks, the groups appreciate the point they are at in the development of the project, assessing the number of steps to be carried out and leading to a constant and bearable.

- Search and collection of information: during this phase, the participants will be able to groups would have conducted their information gathering processes for the context and history of the videogame, using the thinking routine "Reliability of sources" (Figure 6- Thinking routine Reliability of sources).

Figure 6

Routine thinking Reliability of sources

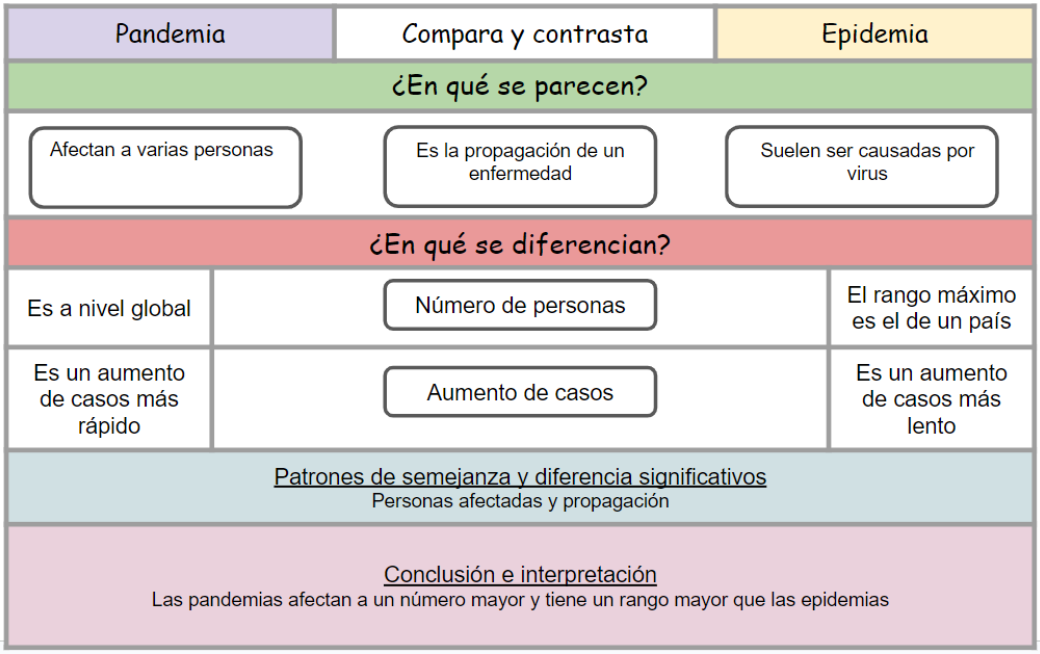


Thanks to these implementations, students would have become aware of the blind trust they have in some everyday sources of information, valuing contrast and veracity over ease.

- Analysis and thesis: throughout this session, the teams would have defined the context and history, relying on the "compare and contrast" thinking routine (Figure 7- Source Reliability Routine Compare and contrast).

Figure 7

Routine Reliability of sources Compares and contrasts



As a consequence of this activity, the students would have been able to verify

the differences between the two concepts to be discussed, highlighting their similarities and differences
avoiding future confusion.
- Workshop and production: at this stage, it was planned to start with the development of the
video game, guided by the "Generate-classify-connect-
Elaborate" (Figure 8- Generate-classify-connect-elaborate thinking routine) and "Storyboard" (Figure 9- Storyboard thinking routine. Implementing the
agreed content based on the subject of Mathematics.

Figure 8

Thinking routine Generate-classify-connect-elaborate

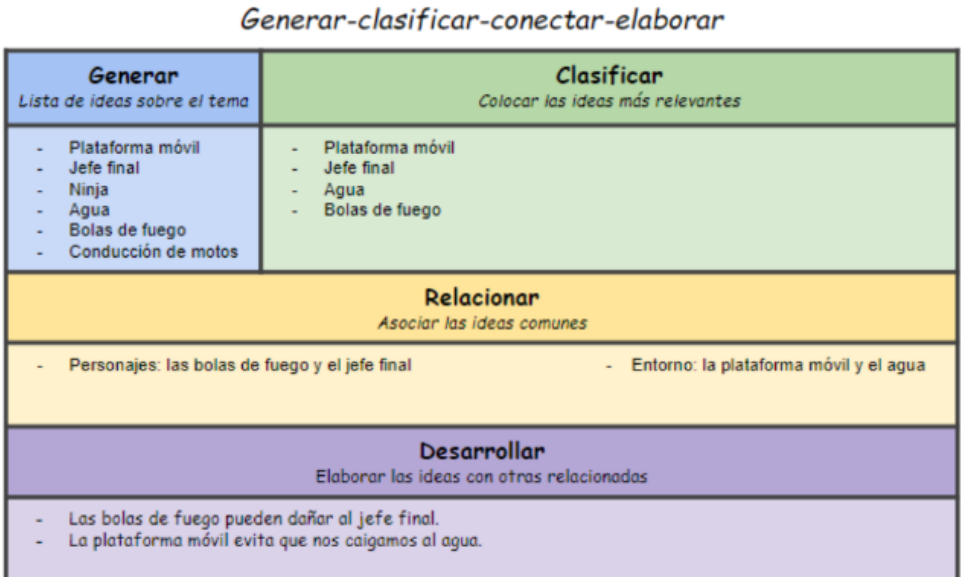


Figure 9

Storyboard thinking routine

Since it has followed a common thread focused from a visual point of view, appreciating the previous and subsequent steps in the development of the project and assessing the sequentiality of the same. The students would not have deviated from their original idea, nor from the proposed objectives, adding the concepts to be dealt with from the Mathematics subject.

- Presentation of projects: during this section, the video games created would have been exhibited video games created. To see the potential of the video game, the

"Gameplay" thinking routine would have been used (Figure 10- Gameplay Thinking Routine) gameplay" thinking routine (Figure 10- Gameplay Thinking Routine) of the same Gameplay) of the same, by means of the Screencast-O-Matic tool.

Figure 10

Gameplay Thinking Routine

As a result of this activity, the students would have reflected their learning process to the rest of their classmates, having the suggestions of their classmates and the teacher as points to improve in their future projects, working at the same time on social skills such as listening, respect and tolerance.

- Collective answer to the initial question: over the course of this period, the initial question "How to control future pandemics through mathematics?" would have been answered (Figure 11- Answering the initial question, using the Lino tool and thought to complete the thinking routine)
"Used to think? now I think?" (Figure 12- Thinking routine Did you use to think? now I think? completed.

Figure 11

Answer to the initial question

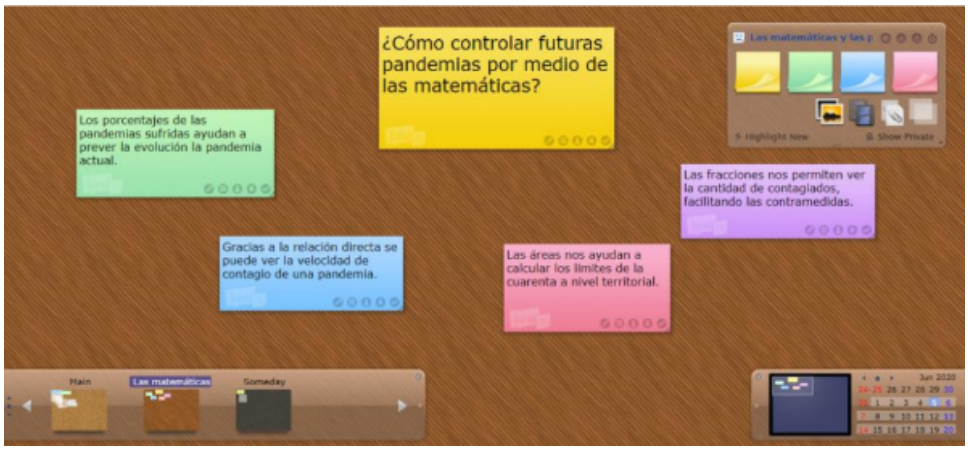
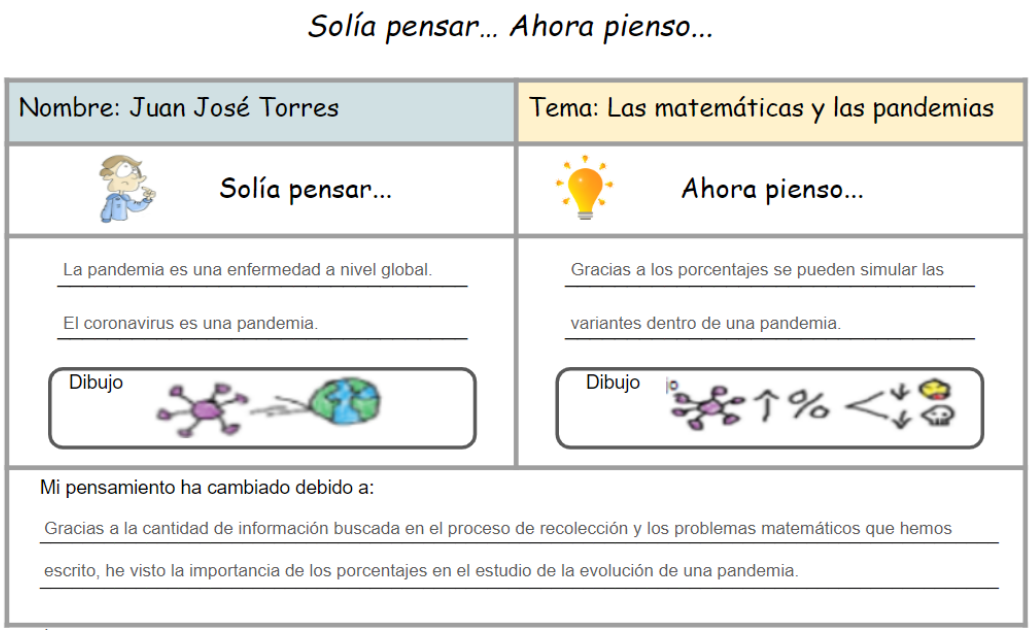


Figure 12

Thinking routine Did you use to think? now I think? completed



Due to a journey carried out in a unison way, prioritizing in the acquired experiences, the students would have appreciated their own collection process, leading to the development of their skills and those of their peers, reaching a meaningful learning, reflected in the thinking routine.

- Evaluation and self-evaluation: during this phase, the following would have been evaluated
results obtained, based on the "Rubric" thinking routine (Figure 13-
Thinking Routine Rubric) offered at the beginning.

Figure 13

Thinking routine Rubric

Haciendo un juego: Las matemáticas y las pandemias				
Categorias	4	3	2	1
Conocimientos adquieridos	Todos los estudiantes en el grupo pueden fácilmente y correctamente explicar varios aspectos sobre el tema usado para el videojuego sin mirar el proyecto.	Todos los estudiantes en el grupo pueden fácilmente y correctamente explicar 1-2 aspectos sobre el tema usado para el videojuego sin mirar el proyecto.	La mayoria de los estudiantes en el grupo pueden fácilmente y correctamente explicar 1-2 aspectos sobre el tema usado para el videojuego sin mirar el proyecto.	Algunos los estudiantes en el grupo no pudieron explicar correctamente los aspectos sobre el tema usado para el videojuego sin mirar el proyecto.
Creatividad	El grupo puso mucho esfuerzo en hacer el videojuego interesante para jugar, como fue demostrado por las preguntas creativas, piezas del juego y/o juego mismo.	El grupo puso mucho esfuerzo en hacer el videojuego interesante y divertido para jugar usando texturas, escritura elegante y/o personajes interesantes.	El grupo trató de hacer el videojuego interesante y divertido, pero algunas de las coasa hicieron el videojuego difícil de entender y/o disfrutar.	Poco esfuerzo fue puesto en hacer el videojuego interesante o divertido.
Atractivo	Colores contratantes y lo menos 3 gráficos originales fueron usados para dar al videojuego un mayor atractivo visual.	Colores contratantes y lo menos 1 gráfico original fue usado para dar al videojuego un mayor atractivo visual.	Colores contratantes y gráficos públicos fueron usados para dar al videojuego un mayor atractivo visual.	Poco o ningún color fueron incluidos
Presición del contenido	Toda la información hecha para el videojuego es correcta	Casi toda la información hecha para el videojuego es correcta	La mayor parte de la información hecha para el videojuego es correcta	La información ofrecida es incorrecta

Thanks to the fact that the student had the evaluation criteria available, he would have known which points of the video game to cover more rigorously, being able to adapt to the teacher's requirements without losing originality.

Discussion and conclusions

After completing this innovation project, a series of conclusions have been reached:

The intrapersonal factor in the creation of the project: in the elaboration of the assumption, a high level of personalization has been appreciated during the realization of the project, leading to significant learning, as the result is part of the individual himself, moving away from the alienation of the contents and incorporating the knowledge to his own mental scheme.

The importance of PBL interconnection: in each phase to be developed, it can be observed that each step to be taken is linked to the previous one, having the sequencing itself a relevant role in the elaboration of the project, taking a bidirectional function, being an important educational factor, due to the importance of the detection of the previous error to achieve a solid base for the new knowledge and vice versa.

The approach to reality provided by PBL: Project Based Learning, has as its pillar to shape the work process, bringing to the classroom the different stages that students will see in their future jobs. This results in meaningful learning, as the student appreciates that the effort made has a logical end for his or her future.

The importance of diversity of thought: during each phase of PBL, the opinion of each component of the team is taken into account, seeking convergence for the completion of each task and the approach to the next step, encouraging cooperation and accustoming students to live together in society, this being an important factor in the education of students, understanding that their opinion is valid, just like the opinions of their peers, working on tolerance.

The synchronization of PBL and thinking routines: thanks to the versatility of the thinking routines themselves, there is an appropriate incorporation in their use, managing to be annexed to the phases of PBL, without altering the flow or nature of both. Encouraging the use of reason as a way to incorporate knowledge through empirical work.

The motivational factor of the video games themselves: by being so present in the students' own context and the attractiveness that they themselves bring, they encourage student participation in the activity, highlighting the personalization of the activity, encouraging students to characterize their work with their own interests.

From a future point of view, it would be advisable to take the implementation to the classroom, because better answers could be obtained from the reality itself, in turn, its operation would be checked and future countermeasures to be carried out would be taken.

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