RGSA – Revista de Gestão Social e Ambiental
ISSN: 1981-982X
Submission date: 09/13/2024
Acceptance date: 11/15/2024
DOI: https://doi.org/10.24857/rgsa.v18n12-179
Organization: Interinstitutional Scientific Committee
Chief Editor: Ana Carolina Messias de Souza Ferreira da Costa
Assessment: Double Blind Review pelo SEER/OJS

ANCESTRAL KNOWLEDGE: TAPTANA CAÑARI, A SYSTEMATIC REVIEW OF THE LAST FOUR YEARS

Rosa Ildaura Troya Vásquez [1]
Diana Micaela López Pérez [2]
Ana María Villón Tomalá [3]

ABSTRACT

Objective: The research aims to analyze how this knowledge, especially Taptana, has been incorporated into educational systems during the last four years..

Theoretical Framework: This systematic review examines the integration of ancestral knowledge in education, focusing on the use of the Taptana Cañari, a mathematical instrument of the Cañari people in Ecuador. The work highlights the importance of ancestral knowledge, which encompasses cultural practices and knowledge transmitted over generations, in a context where globalization threatens its relevance.

Method: The PRISMA method was used for a rigorous review and relevant studies were identified through various databases such as Scopus, SciELO, Redalyc, Dialnet, Erih Plus, Latindex and the César Vallejo University.

Results and Discussion: The findings indicate that the Taptana Cañari is not only a valuable teaching resource, but also reflects an Andean worldview that can enrich mathematical learning and promote intercultural education. However, it is observed that its integration into educational curricula is limited, which poses a significant challenge for its recognition and use.

Implications of the Research: The appreciation of ancestral knowledge is essential to strengthen cultural identity and promote more equitable education.

Originality/Value: Generating spaces for dialogue in classrooms that integrate ancestral knowledge with modern knowledge contributes to a more sustainable future that respects cultural diversity.

Keywords: Ancestral Knowledge, Taptana Cañari, Mathematics, Ancestral Knowledge in Education.

CONHECIMENTO ANCESTRAL: TAPTANA CAÑARI, UMA REVISÃO SISTEMÁTICA DOS ÚLTIMOS QUATRO ANOS

RESUMO

Objetivo: A pesquisa visa analisar como esse conhecimento, especialmente o Taptana, foi incorporado aos sistemas educacionais durante os últimos quatro anos.

Estrutura teórica: Esta revisão sistemática examina a integração do conhecimento ancestral na educação, com foco no uso do Taptana Cañari, um instrumento matemático do povo Cañari no Equador. O trabalho destaca a importância do conhecimento ancestral, que abrange práticas culturais e conhecimentos transmitidos ao longo de gerações, em um contexto onde a globalização ameaça sua relevância.

[1] César Vallejo University, Peru. E-mail: rtroya@ucvvirtual.edu.pe
Orcid: https://orcid.org/0009-0004-5597-0706
[2] National University of Education UNAE, Ecuador. E-mail: dmicaelalopez2000@gmail.com
Orcid: https://orcid.org/0000-0003-2786-4346
[3] National University of Education UNAE, Ecuador. E-mail: ana.villon@unae.edu.ec
Orcid: https://orcid.org/0000-0002-2206-5281

Método: O método PRISMA foi usado para uma revisão rigorosa e estudos relevantes foram identificados por meio de várias bases de dados, como Scopus, SciELO, Redalyc, Dialnet, Erih Plus, Latindex e a Universidade César Vallejo.

Resultados e discussão: Os resultados indicam que o Taptana Cañari não é apenas um recurso de ensino valioso, mas também reflete uma visão de mundo andina que pode enriquecer o aprendizado matemático e promover a educação intercultural. No entanto, observa-se que sua integração aos currículos educacionais é limitada, o que representa um desafio significativo para seu reconhecimento e uso.

Implicações da Pesquisa: A valorização do conhecimento ancestral é essencial para fortalecer a identidade cultural e promover uma educação mais equitativa.

Originalidade/Valor: Gerar espaços de diálogo em salas de aula que integrem o conhecimento ancestral com o conhecimento moderno contribui para um futuro mais sustentável e que respeite a diversidade cultural.

Palavras-chave: Conhecimento Ancestral, Taptana Cañari, Matemática, Conhecimento Ancestral na Educação.

CONOCIMIENTO ANCESTRAL: TAPTANA CAÑARI, UNA REVISIÓN SISTEMÁTICA DE LOS ÚLTIMOS CUATRO AÑOS

Objetivo: La investigación tiene como objetivo analizar cómo este conocimiento, especialmente Taptana, se ha incorporado en los sistemas educativos durante los últimos cuatro años..

Marco Teórico: Esta revisión sistemática examina la integración del conocimiento ancestral en la educación, centrándose en el uso de la Taptana Cañari, un instrumento matemático del pueblo Cañari en Ecuador. El trabajo destaca la importancia de los conocimientos ancestrales, que engloban prácticas culturales y saberes transmitidos a lo largo de generaciones, en un contexto en el que la globalización amenaza su relevancia.

Método: Se utilizó el método PRISMA para una revisión rigurosa y se identificaron estudios relevantes a través de diversas bases de datos como Scopus, SciELO, Redalyc, Dialnet, Erih Plus, Latindex y la Universidad César Vallejo.

Resultados y Discusión: Los resultados indican que la Taptana Cañari no sólo es un valioso recurso didáctico, sino que refleja una cosmovisión andina que puede enriquecer el aprendizaje matemático y promover la educación intercultural. Sin embargo, se observa que su integración en los currículos educativos es limitada, lo que plantea un reto importante para su reconocimiento y uso.

Implicaciones de la investigación: La valoración de los saberes ancestrales es fundamental para fortalecer la identidad cultural y promover una educación más equitativa.

Originalidad/Valor: Generar espacios de diálogo en las aulas que integren los saberes ancestrales con los modernos contribuye a un futuro más sostenible y respetuoso de la diversidad cultural.

Palabras clave: Saberes Ancestrales, Taptana Cañari, Matemáticas, Saberes Ancestrales en Educación.

1 INTRODUCTION

Ancestral knowledge is understood as a set of knowledge, practices and traditions that have been transmitted from generation to generation in various cultures, especially in

indigenous and rural communities. Therefore, said knowledge includes a wide range of areas, including medicine, agriculture, astronomy, spirituality and education, reflecting a deep connection with the natural environment and a holistic worldview of the world (Carranza et al., 2021). Currently, in a globalized context, this knowledge faces the risk of being marginalized or devalued. However, its importance becomes increasingly necessary in the search for sustainable alternatives that promote cultural diversity.

As already mentioned, ancestral knowledge has an important implication in various areas of knowledge, among which is education. The integration of ancestral knowledge into current educational systems plays an important role in the preservation of cultural identities and in the development of innovative approaches to address today's educational challenges, promoting meaningful learning that respects and values the richness of cultural heritage (Sanipatin, 2023).

Today, intercultural education seeks to merge ancestral knowledge with modern pedagogical approaches, promoting meaningful learning that not only enriches academic knowledge, but also fosters respect for cultural identities. Therefore, incorporating ancestral knowledge in classrooms can be a tool that enhances the development of critical skills and promotes harmonious coexistence between different forms of knowledge, thus contributing to a more sustainable and equitable future (Uribe, 2019).

In this sense, the Taptana Cañari arises, which can be defined as an ancient mathematical instrument used by the Cañari people in Ecuador. Which represents not only an invaluable cultural legacy, but also a unique approach to teaching and learning mathematics, based on its Andean worldview (Alquinga, 2020). However, the lack of recognition and dissemination of this ancestral knowledge in the current educational field poses a significant problem. Because, despite its potential as a teaching resource, Taptana has historically been underestimated and poorly integrated into modern educational curricula, which limits its use and understanding in academic contexts.

For this reason, it has been considered pertinent to establish the following research question: How have ancestral knowledge such as Taptana Cañari been integrated into current educational systems in the last four years? To answer this question, the following general objective has been established: analyze the impact and relevance of ancestral knowledge, mainly Taptana Cañari in the teaching of mathematics and its contribution to the recognition of ancestral knowledge. Likewise, the following specific objectives have been raised: identify the characteristics and strengths of ancestral knowledge in education and investigate the current

methodologies that incorporate Taptana Cañari in the educational process and its contribution to the revaluation of ancestral knowledge.

2 THEORETICAL REFERENCE

According to Rosillo et al. (2021), ancestral knowledge is essential to maintain the cultural identity and sustainable development of indigenous communities. According to these authors, ancestral knowledge not only preserves the history and culture of people, but also offers practical solutions to current challenges. Therefore, it is understood that this knowledge is living expressions that have been transmitted from generation to generation, which gives them intrinsic value in the construction of a collective identity that respects cultural and natural diversity.

Ancestral knowledge can be considered an important pillar of cultural diversity, because it provides unique perspectives on the world that contrast with contemporary hegemonic visions (Cabrera et al., 2019). For this reason, the integration of this knowledge in education not only helps preserve culture. Furthermore, by recognizing and valuing this knowledge, the cultural identity of communities is strengthened, allowing their perspectives to be heard and respected on a global level.

In Colombia, the study carried out by Uribe (2019) highlights that ancestral knowledge is essential for the construction of a more equitable and representative education, promoting a pedagogy that values the plurality of knowledge and fosters respect for the diverse cultures present in society. This research emphasizes the need to create spaces for dialogue and reflection in the classroom, where ancestral experiences and knowledge can be shared. Therefore, these approaches not only encourage the active participation of students, but also strengthen their cultural identity and their connection with the environment.

In this same sense, in Ecuador, in the work carried out by Sanipatin (2023) it is mentioned that currently it is of utmost importance to replace traditional education with an approach that integrates ancestral knowledge, in which a space for exchange is promoted where different forms of knowledge are recognized and merged. This approach seeks not only to enrich learning, but also to give prominence to Andean worldviews and local traditions. Therefore, one of the ancestral knowledge that can be used to achieve this is the Taptana Cañari.

According to Alquinga (2020), the Taptana Cañari is recognized as an ancestral instrument that reflects the advanced mathematical thinking of the Cañari communities of Ecuador. This tool not only allows for mathematical calculations, but is also intrinsically related

to the Andean worldview. The research highlights that Taptana allows students to develop logical and comprehensive thinking of the positional system, which is fundamental for mathematical learning.

According to the literature reviewed, the integration of ancestral knowledge, such as Taptana Cañari, into the current educational system represents an invaluable opportunity to enrich learning and promote an intercultural pedagogical approach. The valorization of ancestral knowledge allows for an enriching dialogue between different worldviews, promoting meaningful learning that respects and values the cultural diversity of the country. In this way, Taptana Cañari and other traditional knowledge are effective teaching tools that contribute to the construction of a more equitable and inclusive education, capable of facing contemporary challenges and guaranteeing the continuity of cultural traditions in today's society.

3 METHODOLOGY AND MATERIALS

This section details the method used to carry out the systematic review of ancestral knowledge, with a particular emphasis on the Taptana Cañari. To guarantee a rigorous and transparent process, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method was applied, which contains various steps for the identification, selection and analysis of relevant literature. This method allows for systematic data collection, ensuring that each stage of the process is clear and replicable.

Through the PRISMA method, the aim is not only to consolidate existing findings on the integration of ancestral knowledge in the educational field, but also to contribute to the understanding of the value that this knowledge contributes to the academic and cultural training of students in the Ecuadorian context. Therefore, an exhaustive search was carried out in several databases such as Scopus, SciELO, Redalyc, Dialnet, Erih Plus, Latindex and the César Vallejo University, with the aim of identifying relevant studies on ancestral knowledge and its impact on education, specifically in relation to the Taptana Cañari.

Now, some inclusion and exclusion criteria were applied for the selection of the information. The inclusion criteria for this review were as follows:

1. Year of publication: only studies published in the last four years were considered to ensure the relevance and timeliness of the information.
2. Type of study: original research articles, systematic reviews and studies that address ancestral knowledge or the Taptana Cañari in the educational context were selected.
3. Language: publications made in Spanish and English were accepted.

4. Thematic relevance: only those that focus on the importance of ancestral knowledge in education, the use of the Taptana Cañari in the teaching of mathematics and pedagogical methodologies that incorporate ancestral knowledge were analyzed.

Likewise, the following exclusion criteria were applied:

1. Year of publication: articles published before 2019 were excluded to maintain the relevance of the analysis.
2. Type of study: personal opinion documents and articles that did not present empirical data were eliminated.
3. Language: documents published in languages other than English or Spanish were not analyzed.
4. Thematic relevance: those studies that did not focus on the topic of ancestral knowledge in education and the Taptana Cañari were discarded.

Therefore, to carry out the search for information in the aforementioned databases, Boolean operators were used to facilitate the combination and refinement of the search terms. On the one hand, OR operators allowed synonyms and related terms to be included, thus expanding the scope of the search by capturing a greater variety of relevant studies. On the other hand, the AND operator was used to restrict the results to those that contain all the key concepts relevant to the research. This systematic and strategic approach allowed us to identify articles that address both Taptana Cañari and other ancestral knowledge in the educational context, guaranteeing that the information collected was relevant and aligned with the objectives of the systematic review. For example, the following search formula was used: ("Taptana Cañari" OR "ancestral knowledge") AND ("education" OR "teaching" OR "mathematics") AND ("methodology" OR "pedagogical practice").

Likewise, to illustrate the document selection process in this systematic review, the PRISMA method flow diagram was used, which provided a clear and concise visual representation of each stage of the study search and selection process. This diagram allowed us to effectively visualize the total number of records identified through the database searches, as well as the duplicates removed and the documents that were excluded. This graphic tool is essential to demonstrate how the final articles that were included in the review were arrived at, providing a clear framework to evaluate the rigor of the methodological process used. The phases followed for this process are the following:

1. Identification: records were identified through searches in the selected databases.
2. Duplicate Removal: Duplicate records found during the search were removed.
3. Initial review: The initial review was performed to analyze the titles and abstracts and

determine their relevance according to established criteria.

4. Eligibility evaluation: the full texts of the selected articles were evaluated to confirm their suitability to the inclusion criteria.
5. Final registry: those studies that met all the criteria established to be analyzed in this systematic review were included.

Now, a data extraction matrix was used to organize and synthesize the articles consulted in this systematic review, which allowed the information to be structured in a systematic and accessible way. This tool facilitated the collection of key data from each study, including aspects such as the author, year of publication, objectives, methodologies used and relevant findings related to the Taptana Cañari and ancestral knowledge in education. This developed process is presented in table 1, which is made up of the following elements:

1. Author(s).
2. Year of publication.
3. Objective of the study.
4. Type of study.
5. Main results related to ancestral knowledge in education and the Taptana Cañari.
6. Conclusions.

Through this matrix, an effective comparison was achieved between the different articles, which made it possible to identify patterns, similarities and differences in the approaches and results presented. This organization not only optimized the analysis process, but also ensured that the information was easily retrievable and usable to respond to the research objectives.

This organization not only optimized the analysis process, but also ensured that the information was easily retrievable and usable to respond to the research objectives. Likewise, the data extraction matrix contributed to a coherent and well-founded synthesis of the current state of knowledge on the integration of ancestral knowledge in the educational field at a national and international level.

4 RESULTS AND DISCUSSION

Table 1

Data extraction

Author(s)	Year	Objective of the Study	Methodology	Main Results	Conclusions

Rosillo et al.	2021	Evaluate the level of participation of basic education teachers at the "Mariano Acosta" school, located in the rural parish of Santa María de la Esperanza, Ibarra canton, province of Imbabura, in the dissemination of ancestral knowledge throughout the year 2020.	Non-experimental and cross-sectional study. Intentional sample, made up of 31 students. A absolute frequency analysis and a quantitative study was carried out and the concordance coefficient was used Kendall's W.	The results of the study reveal a worrying low participation of teachers (3.2%) in the transmission of ancestral knowledge, in contrast to the fundamental role played by the family.	The study concludes that there is a significant gap in the transmission of ancestral knowledge due to the limited participation of teachers, making it essential to implement pedagogical actions that strengthen this process and guarantee the preservation of cultural identity.
Uribe	2019	Present the results of a doctoral research that investigates the way in which future science teachers incorporate ancestral knowledge in their training, considering cultural diversity.	A qualitative approach was used based on collective case studies. To collect data, semi-structured group interviews were conducted.	The main results of this study show that teaching strategies in science reveal the need to consider the diversity of worldviews and adopt a decolonizing approach in pedagogical practice.	It is concluded that higher education institutions have an unavoidable social commitment to the vindication of the rights of indigenous peoples, peasants and Afro-descendants. This involves promoting the strengthening of their cultures through intercultural education that promotes respect for diversity and social justice.
Cadena et al.	2024	Evaluate the impact of the Taptana Cañari workshop on mathematics teaching, considering the perceptions of the participants in various contexts.	Non-experimental ex post facto research methodology, with a quantitative approach, and an exploratory and descriptive-correlational scope.	The results of this research highlight the potential of the Taptana Cañari as a teaching resource for teaching mathematics, but also underline the importance of designing pedagogical strategies that make the most of its possibilities. The results suggest that the combination of Taptana Cañari with other tools and methodologies could enrich the teaching-learning process and promote more meaningful learning.	The study concludes that the results obtained indicate a wide acceptance of the workshop, regardless of the place of origin of the participants. Although the general perception of its effectiveness is positive, opportunities were identified to improve its adaptation to the particular needs of each group, especially in terms of relevance and adaptability.
Cabrera & Bojorque	2024	Analyzes the interrelation between the taptana Cañari and the teaching experiences of teachers, in order to understand how this ancestral resource contributes to the	Qualitative approach.	The results of this study show that taptana is a versatile teaching tool that not only facilitates the learning of basic operations, but also promotes the development of higher cognitive skills such as logical thinking and abstraction, while encouraging active participation and	It is concluded that teachers consider that taptana is a valuable teaching tool that contributes to the comprehensive development of students, facilitating the understanding of mathematical concepts, promoting critical and creative thinking, and fostering positive attitudes towards learning mathematics.

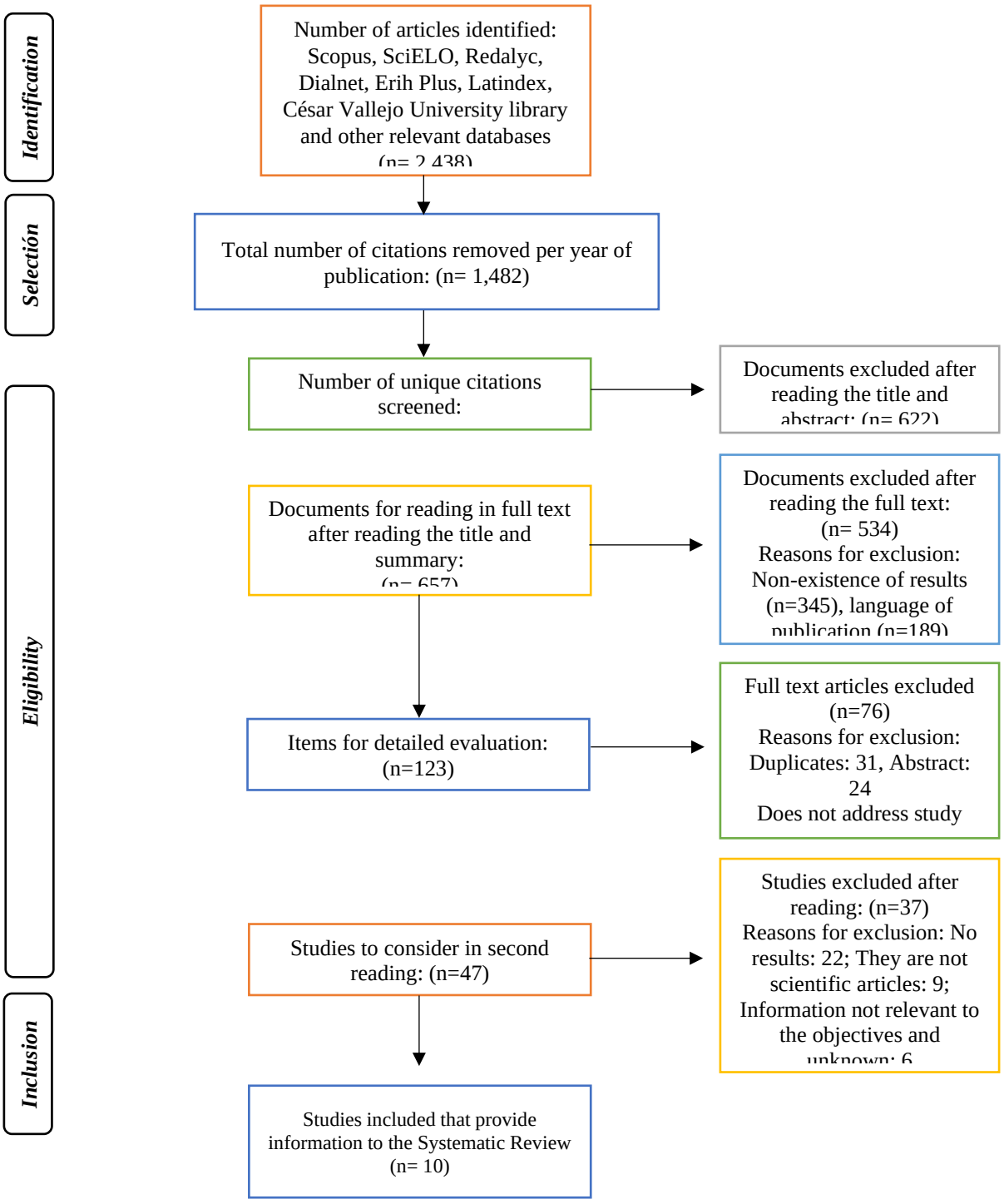
		mathematics learning process.		collaborative work between students.	
Alquinga	2021	Analyze the effectiveness of the Taptana as a pedagogical instrument for teaching and learning basic mathematical operations.	Qualitative methodological research.	The results indicate that the Taptana is an effective teaching tool that has contributed to improving the learning of basic operations. By providing a concrete representation of numbers and operations, the Taptana has facilitated the transition from concrete to abstract thinking, promoting deeper and more meaningful learning.	This study concludes that the Taptana Cañari has proven to be a valuable resource to improve the learning of basic operations. However, the lack of research in this area limits our knowledge about best practices for teaching mathematics. It is essential to invest in educational research to develop more effective pedagogical strategies and thus contribute to improving student learning outcomes.
Auccahuallpa et al.	2021	To analyze the perceptions of 29 early education teachers about the effectiveness of the taptana nail as a tool to develop number sense in children.	Case study.	The results show that the use of taptana nail has proven to be beneficial for the cognitive development of children in early childhood. By manipulating this concrete material, children develop logical-mathematical thinking skills, such as comparison, ordering and problem solving. In addition, the taptana nail favors the development of spatial perception and visual-motor coordination, fundamental skills for learning mathematics.	This study concludes that the incorporation of the taptana nail as a teaching resource in early childhood is revealed as an innovative and effective proposal. The participating teachers agreed that this specific material has allowed children to build a solid understanding of number and basic operations through play and exploration. The results obtained suggest that the taptana nail is a valuable tool to promote cognitive development and significant learning in the first years of schooling.
Cruz	2023	Promote respect and tolerance towards different indigenous cultures, recognizing their intrinsic value and contribution to humanity.	Qualitative ethnographic approach and participatory observation.	The results of this study reveal that cultural diversity in the educational institutions of Bogotá is a reality, however, the lack of clear policies that promote interculturality and respect for differences limits the possibility of building a more inclusive society. It is urgent to implement pedagogical strategies that allow students to value and appreciate the richness of the diverse cultures present in the city.	It is concluded that it is essential for teachers to be actively involved in the implementation of intercultural educational reform projects. Through their education and training, they can develop the necessary skills to establish meaningful links with indigenous communities and design pedagogical strategies that promote the dialogue of knowledge and respect for cultural diversity. "Teachers play a key role in building a more relevant and equitable education for all students.
Paucar	2023	Explore the progress made in the recognition and appreciation of the ancestral knowledge of indigenous peoples within the framework of	Systematic review.	The results of this study reveal that Ecuadorian regulations recognize the importance of ancestral knowledge, but it is necessary to strengthen the mechanisms to guarantee that this knowledge is	The study concludes that although there are significant advances in the recognition of ancestral knowledge, it is necessary to strengthen the monitoring and evaluation mechanisms to determine to what extent these policies are being implemented in

		relations between the State and these peoples.		effectively valued and used in all areas of social life.	educational institutions and in the different instances of the State.
Hinojosa & Chalán	2023	Evaluate the implementation of the Bilingual Intercultural Education System Model (MOSEIB) in the Bilingual Intercultural Community Educational Centers in the southern zone of Ecuador.	Mixed exploratory and descriptive approach.	The findings of this study reveal that 53% of bilingual intercultural educational institutions in the southern zone apply the MOSEIB satisfactorily, while 18% do so outstandingly. However, there is still a considerable percentage of educational centers where the implementation of the model presents difficulties, which limits the transmission of ancestral knowledge.	This study concludes that it is necessary to strengthen the link between the curricular contents and the sociocultural reality of the native communities. To achieve this, the development of relevant educational materials and the active participation of all actors involved in the educational process, especially families and the community, are required.
Durán & Vásquez	2022	Examine the findings of the study to design an educational strategy that integrates the use of the taptana Cañari and the teaching of values such as solidarity.	Qualitative approach and the application of instruments, such as observation guides and participant opinion records.	The main result of this study consists of the development of the 'Taptana Cañari' pedagogical proposal, which not only teaches basic arithmetic operations, but also encourages critical thinking by requiring students to analyze patterns, relationships and calculation strategies. Furthermore, by relating mathematics to history and Cañari culture, it promotes the understanding of how mathematical knowledge has developed over time and in different cultural contexts.	The study concludes that the pedagogical proposal "Taptana Cañari" represents a significant advance in the field of intercultural education, by demonstrating how the integration of ancestral cultural elements can enrich the teaching-learning process and promote values such as solidarity and mutual respect.

Source: Own elaboration

Figure 1

Search diagram



Source: Own elaboration

The use of this data extraction matrix has made it possible to effectively organize and synthesize the information collected from the articles consulted in this systematic review. Furthermore, this systematic organization minimized the risk of losing relevant information and

allowed for a coherent synthesis of the findings, thus contributing to a deeper understanding of the impact and relevance of ancestral knowledge in current education.

According to Rosillo et al. (2021), the role of teachers in the transmission of ancestral knowledge is fundamental, although their participation in this process has been limited. Although families are the main transmitters of this knowledge, with a significant contribution in areas such as the use of medicinal plants and the telling of stories and legends, teachers play a relatively minor role, since only 19.4% of the transmission of ancestral knowledge in the school environment comes from teachers, which indicates an urgent need to implement teaching strategies that strengthen their involvement in this aspect.

In this sense, one of the ancestral knowledge that can be implemented in education in Ecuador is the Taptana Cañari. According to Cabrera & Bojorque (2024), the Taptana Cañari is constituted as a fundamental ancestral knowledge in the field of mathematics, representing a didactic tool that enhances the learning and understanding of basic mathematical concepts. This indigenous counter, originally from the Cañari culture, not only facilitates operations such as addition and subtraction, but also reflects a unique worldview that integrates mathematical knowledge with cultural identity.

The above agrees with the findings found by Alquinga (2021) who emphasizes that Taptana allows educators to implement playful methodologies that promote experiential learning, which is essential to maintain the interest and motivation of students. Furthermore, the use of this tool contributes to strengthening the cultural identity of students by connecting them with their ancestral heritage, thus promoting a sense of belonging and respect for their traditions. However, the author also points out that the dissemination and use of Taptana in Ecuadorian educational institutions has been limited, which highlights the need for initiatives that integrate this ancestral knowledge into school curricula to enrich current mathematics education.

According to Paucar (2023), the recognition and appreciation of the ancestral knowledge of indigenous peoples in Ecuador is a fundamental process for the construction of a more equitable and plural society. Although the Ecuadorian Constitution recognizes cultural diversity and ancestral knowledge as an integral part of the national heritage, the effective implementation of these policies in educational and social practice still faces significant challenges. Paucar highlights that, although there are regulations that promote the inclusion of this knowledge in the school curriculum, its actual application is limited, which results in the persistent invisibility of indigenous practices and knowledge in the educational system.

On the other hand, in the study carried out by Durán & Vásquez (2022), an educational strategy was proposed that integrates the use of the Taptana Cañari and the teaching of values such as solidarity, because it encourages collaborative learning and the development of skills. Mathematics in a cultural context. This pedagogical proposal seeks not only to teach basic mathematical concepts, such as addition and subtraction, through the manipulation of the Taptana, but also to promote solidarity among students by working in groups to solve problems and carry out recreational activities.

As has been seen, the discussion of results shows the importance and relevance of ancestral knowledge, especially Taptana Cañari, in current education in Ecuador. The studies analyzed, including those by Rosillo et al. (2021); Cabrera & Bojorque (2024); Alquinga (2021); Hinojosa & Chalán (2023); Auccahuallpa et al. (2021); among others, they emphasize that the integration of this knowledge not only enriches mathematical learning, but also promotes intercultural education that respects and values the cultural identities of indigenous peoples. Despite the present challenges, such as the limited teacher training and the limited implementation of the bilingual intercultural curriculum, the transformative potential of educational strategies that incorporate both Taptana and fundamental values such as solidarity is highlighted.

5 CONCLUSIONS

The integration of ancestral knowledge, such as Taptana Cañari, into current educational systems in Ecuador has shown a significant impact in the last four years. Through various research, it has been shown that Taptana not only facilitates the learning of basic operations such as addition and subtraction, but also promotes the development of logical thinking and abstraction in students. Teachers have mentioned that this tool is adaptable to different levels of difficulty and that its use increases motivation and the sense of cultural identity among students (Alquinga, 2021).

Therefore, this highlights the need to incorporate ancestral knowledge into the school curriculum, since it contributes to a more inclusive and contextualized education that respects ancestral traditions. Furthermore, the current methodologies that incorporate the Taptana Cañari have allowed a revaluation of ancestral knowledge within the educational field. The studies analyzed have shown that, by integrating this tool in the classroom, experiential and collaborative learning is encouraged, where students not only acquire mathematical skills, but also develop values such as solidarity and teamwork.

The implementation of interactive workshops and recreational activities has facilitated a pedagogical approach that connects mathematical concepts with Cañari culture, thus promoting a sense of belonging and appreciation for cultural diversity. This is of utmost importance to strengthen the cultural identity of students and to ensure that ancestral knowledge is not lost over time.

Therefore, it is concluded that the integration of Taptana Cañari in Ecuadorian educational systems has not only enriched mathematical learning, but has also contributed to the recognition and appreciation of ancestral knowledge. As we move towards a more intercultural and inclusive educational model, it is essential to continue researching and developing strategies that allow teachers to effectively implement this knowledge in their pedagogical practices. The Taptana Cañari is presented as a powerful tool to transform mathematics education, ensuring that new generations not only master essential academic skills, but also keep their cultural heritage alive.

REFERENCES

Alquinga, M. (2021). The Taptana or indigenous counter as a learning strategy in basic mathematical operations. *Cátedra*, *3*(3), 65–87. https://doi.org/10.29166/catedra.v3i3.2428

Auccahuallpa, R., Abad, J., Ullauri, J., & Ullauri, C. (2021). Teacher perception of the concrete material uña taptana in the development of number sense in early childhood. *Runae,* (6), 61–74. https://revistas.unae.edu.ec/index.php/runae/article/view/491

Cabrera, A., Diaz, P., Ruiz, P. & Rodríguez, A. (2019). Own knowledge, resistance and processes of recovery of historical memory in the Muisca community of the city of Bogotá. *NOVUM, 2(*9), 86–100. https://revistas.unal.edu.co/index.php/novum/article/view/78813

Cabrera, V., & Bojorque, G. (2024). The taptana as a tool for teaching mathematics in basic education: teaching experiences. *Mamakuna,* (23), 7–20. https://revistas.unae.edu.ec/index.php/mamakuna/article/view/1007

Cadena, P., Guapulema, R., & Llerena, C. (2024). Perceptions on the pedagogical effectiveness of the Workshop on the use of Taptana Cañari for teaching mathematics: a comparative analysis in different educational contexts. *Revista De Gestão Social E Ambiental*, *18* (5), e07110. https://doi.org/10.24857/rgsa.v18n5-103

Carranza, H., Tubay, M., Espinoza, H., & Chang, W. (2021). Ancestral knowledge: a review to promote rescue and revaluation in the indigenous communities of Ecuador. *Journal of Science and Research, 6* (3). https://doi.org/10.5281/zenodo.5659722

Cruz, F. (2023). A look at ancestral knowledge for intercultural education in the district Educational Institution share the memory and the Cundinamarca School in Bogotá

Colombia, period 2021-2022. *Ciencia Latina Revista Científica Multidisciplinar, 7*(1), 9729-9746. https://doi.org/10.37811/cl_rcm.v7i1.5087

Durán, E., & Vásquez, M. (2022). *Taptana Cañari pedagogical proposal and the value of solidarity*. IV Congreso Internacional De La Universidad Nacional De Educación, 381-386. https://congresos.unae.edu.ec/index.php/ivcongresointernacional/article/view/625

Hinojosa, M., & Chalán, A. (2023). Ancestral knowledge in teaching-learning in the southern area of Ecuador. *Cuadernos De Educación Y Desarrollo*, 13(1). https://ojs.cuadernoseducacion.com/ojs/index.php/ced/article/view/547

Paucar, C. (2023). Ancestral knowledge and indigenous education. *Revista InveCom, 4*(1), 1–18. https://doi.org/10.5281/zenodo.8310262

Rosillo, J., López, J., Rosillo, M., & Lumbi, S. (2021). Teacher participation in the transmission of ancestral knowledge in basic general education. *Editorial Revista Conciencia Digital. Ecuador*. https://doi.org/10.33262/concienciadigital.v4i2.1663

Sanipatin, Y. (2023). Ancestral knowledge as part of the current educational model in Ecuador: Analysis. LATAM. *Revista Latinoamericana de Ciencias Sociales y Humanidades 4*(2), 3772–3783. https://doi.org/10.56712/latam.v4i2.869

Uribe, M. (2019). Ancestral and traditional knowledge linked to pedagogical practice from an intercultural approach: a study carried out with science teachers in initial training. *Educación y Ciudad*, (37), 57–71. https://doi.org/10.36737/01230425.v2.n37.2019.2148