REVISTA CÁTEDRA

La educación intercultural y la etnomatemática en la formación del docente de Matemática y Física

Intercultural education and ethnomathematics in the teacher training in Mathematics and Physics

Iván Dávila-Garzón
Universidad Central del Ecuador, Quito, Ecuador
lidavilag@uce.edu.ec
https://orcid.org/0000-0002-1541-7875

Ximena Pinos-Benavides
Universidad Central del Ecuador, Quito, Ecuador
cxpinos@uce.edu.ec
https://orcid.org/0000-0001-6441-3590

(Received on: 14/10/2018; Acepted on: 24/10/2018; Final version received on: 29/11/2018)

Suggested citation: Dávila-Garzón, I. and Pinos-Benavides, X. (2019). Intercultural education and ethnomathematics in teacher training in Mathematics and Physics. *Revista Cátedra*, 2(*1*),*15-25*.

Resumen

En el rediseño curricular de la Carrera de Pedagogía de la Ciencias Experimentales, Matemática y Física, de la Facultad de Filosofía, Letras y Ciencias de la Educación, de la Universidad Central del Ecuador se incluyen dos disciplinas: Educación Intercultural e Inclusiva y la Etnomatemática. La educación intercultural e inclusiva se presenta con lineamientos para preservar los saberes y cosmovisión de los pueblos plurinacionales. La etnomtemática usa sus aplicaciones en el campo de la matemática. El presente artículo tiene como objetivo estudiar el aporte de las disciplinas mencionadas en la formación académica de los estudiantes y docentes. El estudio se hará a partir de los principales postulados de Osuna y D´Ambrosio quienes realizan sus aportes en torno a la educación intercultural y al inicio del estudio de la etnomatemática, de aquí se determinan los principales insumos teóricos para comprender procesos de construcción y reconstrucción en el proceso de enseñanza-aprendizaje. En el proceso de formación de docentes se analizará los aspectos principales para que su enseñanza sea intencional y orientada a las condiciones de la sociedad actual. En el proceso de formación de los estudiantes que serán los futuros

docentes de Matemática y Física se desarrollarán investigaciones prácticas para impulsar la construcción del conocimiento y fortalecer de la identidad nacional, pues, está desapareciendo. Los resultados del aprendizaje de estas asignaturas fortalecerán la formación integral y las prácticas interculturales educativas con compromiso social y ético.

Palabras clave

Campo de formación, diseño curricular, Educación intercultural, Etnomatemática, formación docente.

Abstract

The research on intercultural education and ethnomathematics in teacher training in Mathematics and Physics is important because of the new curricular design of the Pedagogy Career of Experimental Sciences, Mathematics and Physics at the Faculty of Philosophy, Letters and Education Sciences, Universidad Central del Ecuador. Two disciplines are included in the field of Integration of knowledge and culture contexts, these disciplines are Intercultural and Inclusive Education and Ethnomathematics, and present guidelines for preserving the knowledge and worldview of the plurinational people; ethnomathematics use their applications in the field of mathematics. The objective of this article is to study the contribution of the disciplines mentioned in the academic training of students and teachers, and will be based on the main postulates of Osuna and D'Ambrosio who made their contributions in the intercultural education. The main theoretical inputs to understand construction and reconstruction processes are determined. In the process of teacher training, the main aspects will be analyzed so that their teaching is intentional and oriented to the conditions of today's society. In the process of training students practical research will be developed to promote the construction of knowledge and strengthen national identity, a topic that is being lost.

Keywords

Training field, curricular design, intercultural education, ethnomathematics, teacher training.

1. Introduction

Bibliographic and documentary research on intercultural education and etnomathematics in the teaching of mathematics and physics is very important, reason for which these subjects are included in the new curricular design and their contents should be proposed and developed in the learning process of the new professor. The study of intercultural education will preserve the knowledge and worldview of the indigenous population. Etnomathematics proposes the use of ethnoscience and the application of the resources applied in the field of mathematics.

The main problem of the study is to rescue and recover the ancestral knowledge and the worldview of people. The identification of basic definitions to initiate the knowledge of these subjects with a formative intentionality will be the main target for the development of construction and reconstruction processes of meanings and senses that could work as a foundation in the dialectic relation between human nature and its transformative capacity of the student.

The training process of professors is intentional and oriented to create citizens who meet the conditions that the current society demands. The formation of new professors carries

with it activities to promote the development of people committed to the history and traditions of their environment, deeply reflective with full analysis capacity, argumentation, and someone prepared to assume the work and professional performance required, i.e., committed, flexible and transcendent professionals.

The aim of this research is to collaborate with the education career of experimental sciences, mathematics and physics, in the knowledge organization of the conceptual and self-reference system favoring the interaction between the disciplines. In order to achieve this purpose, methods, processes and procedures will be used, and the professors and students will receive the preliminary guidelines of the intercultural education and the etnomathematics in the new curriculum. In addition and as proposed by Granados (2012), the new approach of higher education is established on the basis of the principle of complementary and interdependent adaptation to the transformations that have occurred in recent years concerning the organization of knowledge and learning of the new epistemological horizons of the complexity and the ecology of knowledge that generate creativity with collaborative and intercultural environments (curricular design of the mathematical and physical career, 2016, p. 22).

The basic nuclei that make up the theoretical-methodological constructs of the disciplines that underpin the profession in relation to intercultural education and etnomathematics are related to contemporary society and educational policy. The strategies and teaching methods will be intended to propose a holistic education with the integration of knowledge to create an active subject committed to the national identity.

This study is important, interesting and relevant since the student of mathematics and physics once graduated will provide his/her professional services in Elementary and High School; thus, with this new knowledge the student will receive better education. The proposal of the redesign is an essential alternative to meet the demands of the institutions of the Ecuadorian Education System, which require the formal inclusion of professionals of these areas in the educational levels indicated.

Mathematics and Physics are disciplines that must be adequately taught, since these contribute significantly to local and regional development. Only the teachers specialized in these subjects are highly qualified and contribute to the improvement of the academic quality of the students and to the formation of good citizens. Thus, they will promote the production of knowledge and the learning, the recognition of reality, the project of life, the learning environments and the integrative nature of the curriculum, aspects that are essential and topical.

The present study presents data related to intercultural education, theories and approaches, inter-cultural teaching practices, intercultural in the Constitution, importance and strategies. Additionally, the importance and object of Etnomathematics are indicated. Finally, conclusions is presented, which will help teachers and students to face this new challenge.

2. Education

2.1 Interculturality: theory and approaches

Interculturality is a way of life and coexistence among individuals that determines the interrelation and interaction of people in a social group. In this regard, Nomberto (2010) states that:

> Interculturality refers to the communicative interaction that occurs between two or more human groups of different cultures. If one or more of the groups in mutual interaction are going to be called ethnicities, societies, cultures or communities it is rather a subject of preferences of schools of social sciences and in no case it refers to epistemological differences (Millán, 2010, p. 18).

In the virtual library of indigenous people, it is indicated that interculturality is the contact and exchange between cultures in equal terms. This contact and exchange should not be thought in ethnical terms but from the relationship, communication and lifelong learning between people, groups, knowledge, values and traditions. All of the above should be oriented to generate, build and promote mutual respect, and a development of the capacities of individuals and community above their cultural and social differences. Therefore, interculturality tries to break with hegemonic history and reinforces traditional identities.

In the intersectional analysis and intercultural approach, Walsh, (2010), states that there are three approaches to interculturalism. The first approach refers to the contact and exchange between cultures, whose problem hides in the domination in which the relationship is carried out. The second approach is called functional, which demands the recognition of diversity and cultural difference as goals of inclusion in the established social structure. The third and final approach is the critical interculturality which recognizes that the difference relies in a colonial structure and matrix of power (Walsh, 2010, pp. 31-52).

Therefore, interculturality means the construction of equitable relationships between people, ethnicities and cultures. Some elements that contribute to intercultural education, as indicated by the United Nations, relate to educational, political, economic, cultural, environmental and legal aspects. In the educational field, interculturalization of education refers to fundamental issues such as education laws, educational projects, objectives, policies, plans and programs, curriculum, teacher training, school textbooks, school culture and the exchange with the community and the context.

In this regard, Walsh (2010) says:

> Interculturality does not separate from identity. The fact of relating symmetrically with people, knowledge, senses and different cultural practices requires a self-awareness of the person, the identities that are formed and emphasize the own and the differences. Self-identity is not something we can choose from, but something that has to be negotiated socially with all the other meanings and images built as knowledge activated by our own use of identity (Hall, 1997), i.e., identifying ourselves with the family and cultural environment requires at the same time to differentiate us from different identification processes that are often unconscious (pág. 54).

From the above, the concepts of location, town or city are mentioned, which are characterized by different cultural traits of each other that allow their distinction. In addition, there can be social subdivisions in each of these groups that maintain their own characteristics that characterize them.

2.2. Intercutural teaching practices

In accordance with the new curricular design (2016), the mathematics and physics career creates inter-cultural practices by introducing the subject of cross-cultural education that benefits the formation of the future professor, one of these practices are: the knowledge of the cultural diversity of the nationalities and people of the country, the valorization of the cultural manifestations of the various members and the application of strategies and creation of didactic resources that allow an intercultural education.

To reach the goal it is possible to develop the creation of projects that promote intercultural education; research that proposes the development of the student in intercultural aspects; to foster interdisciplinarity with etnomathematics to achieve the recovery of ancestral knowledge and worldview, our language and national identity.

2.3 Interculturality in the Constitution of Ecuador

In the Political Constitution of Ecuador of 2008, there are some articles referring to the intercultural education, particularly Article 27 states that education will focus on human beings and ensure their holistic development in the context of respect for human rights, the sustainable environment and democracy it will be participatory, compulsory, intercultural, democratic, inclusive and diverse, of quality and warmth, i.e., it highlights the anthropological character of education, which includes all the dimensions inherent in human beings.; and the intercultural nature of education is also highlighted.

Article 29 states that it is the duty of the State to guarantee the right of people and to learn in their own language and cultural sphere. This requires that all people living in the Ecuadorian territory be taken into account, including those who come from diverse cultural and linguistic realities.

Finally, in article 57, numeral 14, reference is made to develop, strengthen and enhance the intercultural bilingual education system, with quality criteria from early stimulation to the higher educative level. The identities should also be cared for and preserved in accordance with teaching and learning methodologies.

What is indicated in the Magna Carta makes it possible that these aspects are taken into account in the career of mathematics and physics. The student must be led to the preservation of the cultural identities of our country.

2.4 Importance of intercultural education

In accordance with Akros (2018), intercultural education "has gained importance since it proposes that diversity be valued more so that there is more respect for people and their freedom of thought" (p. 2). In this sense it is confirmed that interculturality is a form of coexistence and interaction between people and therefore, in education, communication. With intercultural education, flexibility and reflection are put into practice as part of their identity. It can also be implemented through active methodologies, group work, to develop equality, equity and respect.

In order to achieve the objectives of the teacher training, workshops, trainings and courses must be included, in whichthe future teacher has a preponderant role and adapts according to the reality of the communities, and where permanent socio-cultural changes are experienced with people of different backgrounds and expressions that allow to have links

between cultural groups. In addition, intercultural education is important because of the positive assessment of diversity and respect for people.

Regarding the cultural aspect, every person expresses his/her interactions with others. Therefore, intercultural education develops a reflection and an educational practice that considers diversity to be normal in any group. In this sense, intercultural education can put into practice the flexibility and reflection of each person in its essence and culture because it interacts with others, and is part of their identity.

2.5 Strategies for the intercultural education

In the career of mathematics and physics career values such as equality, respect, pluralism, tolerance, cooperation, responsibility, and the recognition of each student's personal right by fostering their personal identity should be promoted to facilitate learning and achieve objectives. The positives of cultural diversity and languages must be recognized, giving attention to diversity and respect for differences. In addition, demonstrations of racism and discrimination should be avoided, and the promotion of ethnic groups.

To reach the stated objectives, some intercultural strategies should be used, such as avoiding ethnic discrimination in and out of the classroom. Interculturality is treated as a transversal axis of education and is based on intercultural practices, for example, the etnomathematic project. The knowledge and cultural manifestations of the students must be taken into account in the classroom so that through lectures they discover or rediscover the ancestral knowledge of people and nationalities of our country.

3. Etnomathematics

The term "Etnomathematics" was coined by the Brazilian educator and mathematician Ubiratàn D'Ambrosio in 1977, during a presentation for the American Association for the Advancement of Science. From this date, numerous proposals have been made to obtain a more precise definition, included by the same D'Ambrosio in 1999, who indicates that the etymological abuse leads him to use the words ethno and mathema for their categories of analyses and Ticas representing technique (Martínez, 2013, p. 429).

Rohrer and Schubring (2011) indicate that Falsirol used the term Etnomathematics as a combination of ethnology and mathematics, and he used it before D´Ambrosio and referred to the work of Ewald Fettweis work (German mathematical educator: 1881-1967). The conceptualization managed by Fettweis considered mathematics as a cultural element that connected with other disciplines, such as: ethnology, history of mathematics, history of culture and mathematical education (Martínez, 2013, p. 429).

Etnomathematics of D´Ambrosio refers to the mathematics practiced by groups such as urban communities, rural, workers, professional classes, specific ethnicities and community of professional mathematicians. He points out that this discipline was created by specific ethnicities and by other cultural groups according to their own mathematical processes, symbols, jargon, mythologies and reasoning models (Martínez, 2013, pp. 429 – 439).

Etnomathematics in its etymology is based on three roots: ethno, matema and tica. *Ethno*, which comes from the Greek root ethnos that means peoples/races refers to the various natural, social, cultural and imaginary environments. *Mathema* from the Greek to explain, to understand, to teach, and *Thica* linked to the Greek root tecni, related to the arts, techniques and ways (Martínez, 2013, p. 430).

From the previous consideration, Gilmer (1995, p. 188) assumes etnomathematics as the "study of the mathematical techniques used by cultural groups identified to understand, explain and manage problems and activities that arisen in their own environment". Additionally, Gerdes (2007), indicates that the etnomathematics is derived from the overlap that occurs between cultural anthropology, mathematics and mathematical education, mentioning the need to be aware on the existence of various mathematics, according to different cultures.

Thus, it can be indicated that the etnomathematics is practiced by cultural groups, identified social groups and guilds, in which its reality is better understood. In addition, this mathematics is usually practiced since they are children.

It can also be said that etnomathematics is a variation of mathematic didactics, and it is interested in studying the knowledge of a cultural group and their behaviors for interpreting the world and their Cosmo. Therefore, the etnomathematics thought is a way of understanding the learning process of mathematics according to ancestral knowledge.

Gómez and Ortiz refer to Gavarrete (2012) by pointing out that at the end of the last century, several discussions were developed on the linguistic and sociocultural aspect of mathematics, such as the language used, the semantics, the influence of culture and society. In the present century, it reflects on the most appropriate way of legitimizing the knowledge of the etnomathematics. Epistemological and political aspects are taken into consideration in order to generate more democratic access to mathematics (Gómez and Ortiz, 2016, p. 23). In addition, it should be noted that in the learning process, the etnomathematics should consider the ancestral inheritance and the particularities of the group's worldview, and this must be conceptualized and worked for indigenous communities, people or cultures. Mathematical concepts must be linked to the social and economic structures of them, and learning methods and arithmetic and geometric techniques should be used, and should be contextualized to their surroundings in order to obtain the knowledge of the students.

4. Target of Etnomathematics

According to Oliveras (2000), the object of study of the etnomathematics refers to three thematic areas that are well defined:

The first corresponds to the cultural-mathematical anthropology with respect to the elements that are needed to theoretically define the terminology and the anthropological and epistemological approach of etnomathematics, and to be able to understand them. The second thematic area refers to the mathematical cognition contextualized towards the groups, and corresponds to the elements of the cognitive psychology related to the mathematics in the daily life and the mathematical learning in the school and out of it. The third are the curricular aspects and processes that correspond to the socio-cultural and political conditions related to the problem of curriculum and learning (Gavarrete, 2012, p. 49).

Etnomathematic knowledge has been present in most cultures throughout history, since cultural diversity is one of the characteristics of every civilization in the world. The origin of etnomathematics relies to the emergence of the ethnosciences and anthropological research that has developed since the nineteenth century (Trujillo, 2016).

To understand the intrinsic relationship between the ancestral knowledge of people and fields such as mathematics corresponds to traditional activities, for example, working with plants, animals, architectural conceptions, graphic representations. Finally, etnomathematic is centered on the nature.

4.1 The training of the math professor

In the study carried out by Juan Ramón Cadena entitled "Insertion of the etnomathematics in the teacher training in the Ecuadorian higher education", indicates that in Ecuador the careers of teacher training in Mathematics have not considered this discipline in any case. The results of a survey of fifth-semester students of the teaching career in mathematics, Universidad Central del Ecuador, determines that the level of basic knowledge of mathematical concepts, history, etnomathematics is deficient. A teaching practice must be developed involving two independent but non-dichotomous processes, teacher training and classroom practice.

In the teacher training, the insertion of etnomathematics should be taken into account as a process that allows the extrapolation of practices towards the construction of a theoretical construct. Thus, there must be a dialectical bidirectional relationship of praxis and theory. As indicated, one of the most pressing problems in mathematics teachers is the search for problems and didactic situations. All the methodologies used should propose a meaningful learning in the students.

Didactic intervention is a very delicate process. According to the analysis of Cantoral (2016), three planes are articulated in the creation of conceptual systems:

- The first is the problem as a consequence of the nature of mathematical knowledge.
- The second, for the knowledge is the "local", which implies a social praxis adjacent to the characteristics of the environment, the context and the idea.
- The third is the search for an own epistemology of mathematical knowledge, the set of categories from didactic activity and systematized experiences that produce a theory of authentic and autonomous learning.

The teaching-learning process of mathematics in Ecuador has mainly been based on the uncritical acceptance and reproduction of the western rationality model. The Andean rationality recognizes the otherness or difference as something essential that admits and is enriched with other forms of sensibility in the comprehension of the world. There is symmetry, which is reciprocity, reflected in a dualistic view of reality and non-arbitrariness.

Therefore, the objective is to know the conceptions of contemporary culture and education in a dialogue with anthropology, history, sociology and educational psychology. These constructs help the learning process and develop the pedagogy of mathematics. In addition, the aspects relating to the characteristics of each cultural sector should be taken into account, considering the specific conditions of cognition and conceptualization of mathematical elements.

5. Conclusions

The career of Education in the experimental sciences, mathematics and physics practices the intercultural education inside its classrooms, and proposes to develop the concepts in

the practice and in the linkage with the society through its practical application in the individual and group research.

Using active methodologies makes necessary to realize the discovery and rediscovery of the contents of the etnomathematics; thus, bibliographical and documentary research will be used with individual and group work, exhibitions and elaboration of graphic organizers.

The use of interculturality will be evident in the knowledge of its principles, and it will be carried out in educative institutions through intercultural educational practices. Etnomathematics will contribute significantly to the rescue of ancestral knowledge.

Interculturality and etnomathematics can be carried out with field work that contributes to meaningful learning to assess the cultural identity of the country in an efficient way. The basic definitions will be identified to initiate the knowledge of these subjects through the development of construction and reconstruction processes.

The teacher training process will be intentional and oriented to the conditions demanded by today's society, and will be related to the educational policy, the training of the person and the professional development of the teacher as a reflective, analytical, critical, committed, flexible and transcendent entity.

It will be necessary to improve the academic quality of the students, future teachers, in the formation of good citizens. One of the strategies will be the implementation of intercultural education in the classrooms. The application of etnomathematics in the Elementary and High Schools through educational intercultural practices and the rescue of the ancestral knowledge. Bibliographical and field research will contribute to meaningful learning to assess the cultural identity of the country.

Bibliography

Asamblea Nacional del Ecuador. (2008). Constitución de la República del Ecuador. Quito - Ecuador: Lexis.

Blanco, H. (2008). Entrevista al profesor Ubiratán D'Ambrosio. [Documento el Línea]. Revista Latinoamericana de Etnomatemática, 1(1). 21-25. Disponible en http://www.etnomate-matica. org/v1-n1-febrero2008/blanco.pdf.

Blanco-Álvarez, H., Higuita Ramírez, C., & Oliveras, M. L. (2014). Una mirada a la Etnomatemática y la Educación Matemática en Colombia: caminos recorridos. Revista Latinoamericana de Etnomatemática, 7 (2), 245 – 269.

Cadena Juan Ramón. (s/f). Inserción de la Etnomatemática en la formación docente en la Educación Superior Ecuatoriana. Quito. Ecuador.

Carrera de Matemática y Física. (2016). Diseño Curricular de la Carrera de Matemática y Física, Quito, Ecuador.

Durán R. Rolando. Teoría de la interculturalidad. https://www.academia.edu/14475097/Teor%C3%ADa_de_la_interculturalidad?auto=download

Falconi G. José. Principios de interculturalidad. Recuperado el 21 de octubre del 2018, de https://derechoecuador.com/principios-de-interculturalidad.

Gavarrete María Elena. (2012). Modelo de aplicación de Etnomatemáticas en la formación de profesores en el contexto indígena de Costa Rica.

Gerdes, P. (2007). Etnomatemática. Reflexões sobre Matemática e diversidade cultural. Famalicão: Edições Húmus.

Gilmer, G. (1995). Una definición de Etnomatemática. Boletín ISGEm, 11 (1), p. 188. En H. Blanco (Comp.). Boletines del grupo de estudio internacional de Etnomatemática: ISGEm, 1985-2003, disponible en http://www.etnomatematica.org/home/?page_id=112.

Gómez Guerra Enrique Octavio, Ortiz Lucero María Fernanda, (2016), Incorporación participativa de formas de pensamiento etnomatemático en programas curriculares de 5to, 6to y 7mo año de educación básica de dos colegios particulares de Quito para el año lectivo 2016 – 2017, PUCE, Quito, Ecuador.

La importancia de la educación intercultural. Recuperado el 21 de octubre del 2018, de https://akroseducational.es/blog/la-importancia-de-la-educacion-intercultural/

Marga Carol. (2017). La importancia de la educación intercultural en un mundo globalizado. Recuperado el 21 de octubre del 2018, de http://colegioedwardconcepcion.cl/la-importancia-de-la-educacion-intercultural-en-un-mundo-globalizado/.

Martínez Padrón Oswaldo Jesús, (2013), Etnomatemática: una reseña crítica de sus acepciones, Revista científica, Educación científica y tecnológica / ISSN 0124 2253/ Octubre de 2013 / Edición especial / Bogotá, D.C.

Nomberto, Víctor. (2010). Teoría de la interculturalidad. Recuperado de

http://blog.pucp.edu.pe/blog/victornomberto/2010/02/18/teor-a-de-la-interculturalidad/

Oliveras María Luisa. (2000). Etnomatemáticas. En J. Fuentes y M. L. Olivares. Matemáticas en la Sociedad. Granada. España. Repro-digital.

Prieto Martín.(2017). Enfoques de la interculturalidad. Recuperado el 2018-10-21 en https://prezi.com/qjqy60lojrsn/enfoques-de-la-interculturalidad/

Trujillo Pablo. (2015). Cultura, Identidad e Interculturalidad. Recuperado el 21 de octubre del 2018, de https://es.slideshare.net/pablotrujillo3956/cultura-identidad-e-interculturalidad

Trujillo, J. (2016). La Etnomatemática Runayupay. Recuperado el 08 de agosto de 2016, de Proyecto Etnomatemática Runayupay: http://www.etnomatematica-ecuador.runayupay.org/assets/doc-141128-la_etnomatematica_(jt).pdf

Walsh, Catherine. (2010). Análisis interseccional y enfoque intercultural.

Authors

LUIS IVAN DAVILA-GARZON holds a Master's degree in Education with a specialization in Educational Management, Universidad Politécnica Salesiana (Ecuador) in 2012. He obtained a Master in University Teaching and Educational Administration from Universidad Tecnológica Indoamérica (Ecuador) in 2003. He obtained his PhD in Education sciences, Universidad Central del Ecuador (Ecuador) in 2001. He got a bachelor's degree in Education Science in the specialization of Physics and Mathematics, Universidad Central del (Ecuador) in 1981.

He is currently a professor of mathematics and physics at the Faculty of Philosophy, Letters and Education Sciences of Universidad Central del Ecuador. He is the author of several books and articles published.

XIMENA PINOS-BENAVIDES obtained her master's degree in criminal law, Universidad Tecnológica Indoamérica (Ecuador) in 2012. She obtained a title of procedural law, Universidad Tecnológica Indoamérica (Ecuador) (Ecuador) in 2009. She has a Diploma in Procedural Law, Universidad Tecnológica Indoamérica (Ecuador) (Ecuador) in 2008. She holds a degree of specialist in Applied Geography, Universidad Andina Simón Bolívar (Ecuador) in 2007. She obtained the title of Docto in law of the courts and judgements of the Republic, Universidad Central del Ecuador (Ecuador) in 2005. She obtained a Bachelor of Science Education in the specialization of History and Geography, Universidad Central del Ecuador (Ecuador) in 2004.

She is currently a professor of Mathematics and Physics at the Faculty of Philosophy, Letters and Education Sciences of Universidad Central del Ecuador. She is the author of several books and published articles.