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Ubiratan D'Ambrosio: Celebrating His Life and Legacy

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Ubiratan D'Ambrosio: Celebrating His Life and Legacy

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Abstract

On May 12th, Brazil and the world said goodbye to one of its biggest names in mathematics education, Ubiratan D'Ambrosio (December 8, 1932 – May 12, 2021). D'Ambrosio is recognized both throughout Brazil and internationally for having been the creator of ethnomathematics, a concept that acknowledges, values, and respects different mathematical ideas, procedures, and practices developed by the members of distinct cultural groups. D'Ambrosio analyzed the history of explanations of life and of natural evolution in different cultures. In the last years, his motivation had been the pursuit of peace, in all its four dimensions: individual, social, environmental, and military. In this paper we pay homage to Ubiratan D'Ambrosio, sharing our thoughts related to his personal, professional, and academic life.

Keywords: Ubiratan D'Ambrosio, ethnomathematics.

1. Initial Considerations

The life history of our dear friend and mentor Ubiratan D'Ambrosio represents many facets, each of which contains stories to be unveiled gradually through the eyes of historians, educators, researchers, and his former colleagues, friends, and students. His history also reveals a way that exhibited brilliant lessons, and a life that walked the talk.

In our meetings with him at congresses and events relating to mathematics education, both in Brazil and internationally, as well as our treasured conversations over meals with him and his wife Maria José, in their apartment in São Paulo, the richness of his life history was revealed. As he shared with us his thoughts and memories, we were able to follow up on his personal, professional, and academic trajectories.

We hope that the tribute we pay here to D'Ambrosio in this manuscript is meaningful and relevant to the mathematics education community, his family, and friends. And we hope it humbly reflects the privilege we had in being with him and his family. In so doing, we know it is incomplete, it is far too soon, and the pain of his loss is far too real, but we hope this paper will allow for a beginning conversation, that mitigates the deep *saudades*[1] that we and so many of us feel right now for *Ubi*.[2]

In general, D'Ambrosio's international contributions to the development of education are prodigious and will form deeper aspects and objects for research in the future. Given that he was an innovative thinker, and a beloved international leader and worldwide disseminator of ideas related to the development of the field of ethnomathematics and the construct of non-killing mathematics, applications of his ideas to mathematics education are both powerful and profound.

To be close to one of the most important and influential mathematicians of the 20th and 21st centuries was clearly a privilege, mainly in relation to his mentorship, support, and encouragement of hundreds of researchers through investigations related to the social, political, economic, environmental, and cultural features of mathematics. His work promotes interactions among all social classes through looking at the diversity of how mathematics is used in diverse contexts.

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[1] In Portuguese language and culture, *saudades* means a deep emotional state of melancholic longing or yearning for a person or thing that is absent. It is a untranslatable Portuguese term, which is related to a recurring theme that refers to a sense of loneliness and incompleteness. In this context, *saudade* can be used to say that we miss someone or something, even if we will see that person or thing in the near future.

[2] Since Ubiratan D'Ambrosio continued to be our mentor and, most importantly, our very dearest friend, in some parts of this paper, we call him Ubi as an affectionate way to show our love and respect.

In this perspective, D'Ambrosio's preoccupation with the welfare of all people, and the preservation of our fragile natural and cultural resources can be synthesized as peace in its several dimensions: inner peace, social peace, environmental peace, and political-military peace. According to [7] this is essential for building up a civilization that rejects *inequity, arrogance,* and *bigotry*, which are essentially violations of peace in its various dimensions. Being around him, we felt all of this.

2. Our Personal Relations with Ubiratan D'Ambrosio

Our personal relations with D'Ambrosio, in the last 25 years, helped us to understand his role as a person and as an educator in the field of mathematics education and the Program Ethnomathematics as a complementary philosophy that fulfilled his commitments to a healthier and a more just social order with more dignity and quality of life for all humankind.

The events we shared in our time together during these years only increased our admiration for *Ubi* as he has participated in our personal lives, as well as in our academic and professional development, due to the various projects, congresses, and events that we participated in cooperation.

2.1. D'Ambrosio and Orey: the Beginning of a Friendship and Mentorship. . .

I first met Ubiratan D'Ambrosio, in 1996, at a conference in California. I found him sitting on a bench by himself after his speech. Over the years, I used to enjoy watching from afar, as he sat after talks in conferences, and just watching people talk to him. This particular one was mine. I approached him and asked if he needed any help, and we ended up spending the next three days together, walking the beach, conversing about life, ethnomathematics, Latin America, and Brazil, whereupon he invited me to come to Brazil.

I feverishly began a study of Portuguese and wrote a Fulbright application. *Ubi* was generous in sponsoring me and connected me with the right people in Campinas, where I spent time learning about how Brazilian scholars and teachers use mathematical modeling to document ethnomathematics. Figure 1 shows D'Ambrosio and me (Orey), in São Paulo, Brazil, in 2016.

Figure 1: D'Ambrosio and Orey in 2016. Picture taken by Milton Rosa.

Thanks to his continued encouragement, I have continued to work, present, have connections with researchers in Nepal and now live in Brazil. His work, love and patience, and his encouragement mean so very much to me, and, I can confidently say, hundreds of other scholars worldwide, whose lives he touched like he did mine, deeply admire, love, and respect him for his work and contributions to the field of mathematics education.

D'Ambrosio's invitation to study in Brazil enabled me to meet Milton Rosa, in 1998, while serving as a Fulbright scholar to the *Pontifícia Universidade Católica de Campinas* (PUC-Campinas). As a member of one of the five teacher-researcher groups, he generously facilitated a series of visits for me to his schools in Amparo, in the state of São Paulo, in Brazil. Figure 2 shows D'Ambrosio, Rosa, and me (Orey), in São Paulo, Brazil, in 2015.

I ended up being adopted by Rosa's family, schools, and neighborhood. In 1999, Rosa was selected to participate in the California State teacher exchange, and ended up being the first South American, as well as the first Brazilian to participate in it. We continued the pattern of research in his new classroom environment in the States where I assisted him in adjusting to teaching in a California public school. This opportunity allowed him to earn a masters' degree in mathematics education.

Figure 2: D'Ambrosio, Rosa, and Orey in São Paulo in 2015 (from Orey's personal collection).

Rosa's work at the school in Sacramento had been so well received that the school district offered to sponsor him to extend his visa, which allowed him to be enrolled in a doctoral program. Together we have collaborated on numerous projects, books, chapter books, and articles under the continued guidance and mentorship of D'Ambrosio.

During this time, D'Ambrosio encouraged us to develop our research in ethnomodelling through our discussions in meetings in conferences and congresses abroad. We will dearly miss our meetings with him in his apartment in São Paulo for the many lunches and dinners, laughter, and encouragement he freely shared with us.

2.2. D'Ambrosio and Rosa: A Dream Come True...

In 1996, when I was teaching mathematics at a public school in Amparo, in the state of São Paulo, Brazil, our school library was receiving new books from the state government and was making available some books that were placed on the table in the teachers' lounge. One of those books was entitled:

Ethnomathematics, written by D'Ambrosio, in 1990. I took this book and read it in less than two hours! Then, I became interested in its contents and tried to apply some ideas regarding its pedagogical action in classrooms with my students.

In 1998, I joined a *Specialization Course in Mathematics Education* at *Pontifícia Universidade Católica de Campinas* (PUCCAMP), on *Ethnomathematics and Mathematical Modelling*, promoted by Ubiratan D'Ambrosio, Geraldo Pompeo, Rodney Bassanezi, among others. D'Ambrosio was my *Mathematics History* teacher. Figure 3 shows D'Ambrosio and me (Rosa) in 1998, at PUCCAMP.
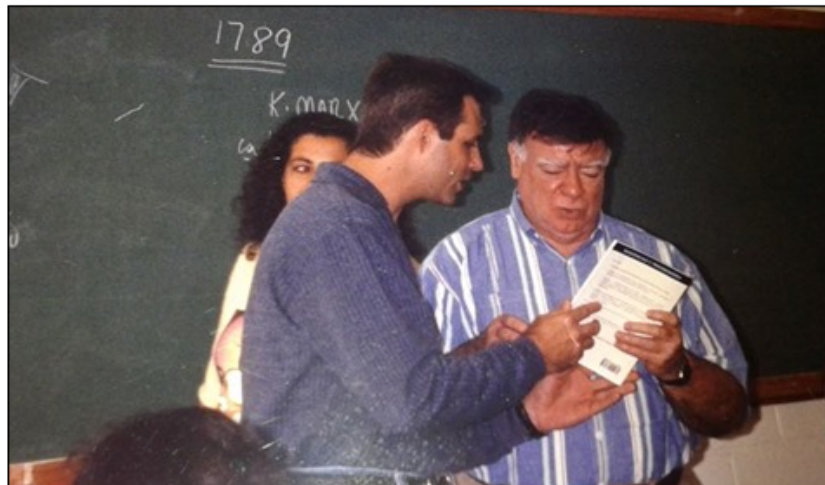
Figure 3: D'Ambrosio and Rosa at PUCCAMP in 1998 (from Rosa's personal collection).

At that time, we spoke about his book and ethnomathematics. We also exchanged some ideas for the development of pedagogical action in my classrooms. In this course, because of D'Ambrosio, I met Daniel Orey who was a Fulbright Scholar in ethnomathematics and mathematical modelling at PUCCAMP during the second semester of 1998.

In 1999, with Orey's help I was invited to participate in an *Exchange Visitor Program for Teachers,* sponsored by the California State of Education, from September 1999 to January 2011. I taught Mathematics at a public high school in Sacramento, California, mainly for immigrant students.

In 2000, I finished my Masters' degree in Mathematics Education at California State University, whose problem statement was related to offering a mathematics curriculum based on ethnomathematics and modelling perspectives for immigrant students in California. During this time we exchanged ideas related to this mathematics curriculum and D'Ambrosio was the external reader of my dissertation.

In 2002, I helped to organize an event entitled *Supper with Ubi D'Ambrosio*, promoted by the University of California, Davis. D'Ambrosio stayed with us for 10 days, and he gave some lectures in schools and universities, and visited the high school in which I worked and spoke to my immigrant students in their different languages.

During my time in California, we met Ubi in several congresses and conferences in the United States and in Brazil when I visited my family during my vacation time. Figure 4 shows me (Rosa) and D'Ambrosio in his apartment in São Paulo, in November 2019, in my last visit before Covid-19.

Figure 4: Rosa and D'Ambrosio in his apartment in São Paulo (from Rosa's personal file).

We collaborated in writing book chapters and articles. When in Brazil, we met in São Paulo, in his apartment, with his wife Maria José, for lunch, coffee, and dinner, in which we spoke about life, mathematics education, our families, friends and, of course, ethnomathematics. Figure 5 shows D'Ambrosio and his wife in their apartment in São Paulo, in November 2019, before the pandemic.

Figure 5: D'Ambrosio and his wife Maria José, in their apartment in São Paulo. Picture taken by Milton Rosa.

In 2010, I finished my doctoral degree at California State University in which I studied the influence of language and culture on mathematics for English Language Learners in an ethnomathematical perspective according to school leaders' perceptions. We continued to exchange ideas related to ethnomathematics and its influence for the teaching and learning process for immigrant students, as well as the development of ethnomathematics, ethnomodelling, and creative insubordination.

3. D'Ambrosio's Professional and Academic Life

The life history of Ubiratan D'Ambrosio[3] provides a reflection on mathematics education found both in Brazil and internationally. In 1951, D'Ambrosio entered the *Faculdade de Filosofia, Ciências e Letras* at the *Universidade de São Paulo* (USP), where he studied for a bachelor's degree in mathematics. In the third year of his studies, he started teaching both classic and scientific courses in junior high and high school. After graduating, in 1954, he also worked at the *Pontifícia Universidade Católica de Campinas* (PUCAMP).

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[3] The information provided in this section was given by D'Ambrosio through interviews given to Milton Rosa from 2000 to 2010.

In 1955, he was awarded with his degree in the teacher education program in mathematics from the same *Faculty* at USP.

In 1958, D'Ambrosio became a full-time instructor at the *Escola de Engenharia de São Carlos* (EESC), at USP. In 1961, D'Ambrosio transferred from the EESC to the *Faculdade de Filosofia, Ciências e Letras de Rio Claro*, subordinated to the *Departamento de Educação do Estado de São Paulo*, where he taught the disciplines: *Algebra* and *Higher Analysis* of the *Degree in Mathematics*. From 1960 to 1961, D'Ambrosio was awarded with a *Italian Government Scholarship at the Istituto Matemática dell'Università di Genova*, in Italy.

In 1963, D'Ambrosio finished his doctorate in pure mathematics and defended his thesis entitled *Generalized Surfaces and Finite Perimeter Sets*, from EESC, at USP. In January 1964, he was invited to develop his postdoctoral work, from 1964 to 1965, as a *Researcher Associate* in the *Department of Mathematics* at Brown University, in Providence, Rhode Island, USA.

Thus, in 1964, D'Ambrosio went to the United States accompanied by his wife Maria José and his two children. Although the intention was to take a leave of absence from Rio Claro for a year, the military coup led him to remain longer in the United States, where he obtained a tenured professorship at the *State University of New York* at Buffalo. He served as a professor in the undergraduate and graduate courses in mathematics, also working as a researcher and adviser.

During their stay in the United States, D'Ambrosio devoted himself to the study of and research in pure mathematics. In 1970, he became responsible for the *Mathematical Analysis Sector* of a project proposed by the *United Nations Educational, Scientific and Cultural Organization* (UNESCO) that was implemented in the Republic of Mali, in Africa. The project was designed to prepare and train doctors in mathematics (*Project CPS-Bamako*[4]).

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[4] This project, known as the Centre Pédagogique Supérieur de Bamako, which began in 1971, exemplifies a successful approach to higher education in one developing country, Mali. The Centre was created in response to the need for personnel with higher education both in the academic and professional fields and provided a programme of intensive training at the post-graduate level, which depended largely on the collaboration of visiting professors. By 1977, this programme had formed 20 *docteurs de spécialité* with a level comparable to

D'Ambrosio traveled every three months to, and spent about three weeks in Bamako, capital of Mali. He was also Consultant and Visiting Professor at the *Graduate Program of the Center Pédagogique Supérieur*, Bamako, Mali, from 1970 to 1980. His first advisee to obtain a doctorate degree in Africa was Bakary Traoré, in 1973.

In 1972, D'Ambrosio decided to return to Brazil, to the *Universidade Estadual de Campinas* (UNICAMP), where he worked as the Director of the *Instituto de Matemática, Estatística e Computação Científica* (IMECC), from 1972 to 1980. In addition to developing research in pure mathematics, he still continued his participation in the doctoral project in Africa. In that context, he supervised several doctoral and masters' degrees at UNICAMP.

Upon returning to Brazil, D'Ambrosio's interest in developing the research and training of human resources for the teaching of science and mathematics began. In 1974, he started a project equivalent to the one he participated in Africa, at the Master's level, for all Brazilian states and for all countries in Latin America and the Caribbean, with extensive funding from the *Ministry of Education of Brazil* and *the Organization of American States* (OAS). He was the director of this *Master's Degree Program in Science and Mathematics Teaching* from 1975 to 1980.

In 1978, Ubiratan began to participate in the annual meetings of the *Pugwash Conferences on Science and World Affairs*, where, in general, topics related to nuclear issues and peace were discussed. The members of the organization are elected by its active participants, and D'Ambrosio was elected as a member in 1987 and reelected in 1992.[5]

It is necessary to emphasize here that D'Ambrosio was a signatory to important documents in the world of science, such as the *Venice Declaration*, in 1986, which was developed in the symposium entitled *Science and the*

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the French *3 cycle*, but with its own characteristics and absolute identification with the problems of education in Mali and its role in the process of development in that country [4].

    [5] In 1995, the *Nobel Peace Foundation*, in recognition of the service being done in the name of world peace, awarded half of the *Noble Peace Prize* to *Pugwash Conferences*, and the other half of this prize was given to Professor Joseph Rotblat, then president of that organization. This double prize honored the members of this organization [3].

Boundaries of Knowledge: The Prologue of our Cultural Past, organized by UNESCO, that encouraged further reflection in a spirit of transdisciplinarity and universality.[6]

D'Ambrosio also signed the *Charter of Transdisciplinarity* in 1994, in which participants discussed the anthropological importance of transdisciplinarity, as well as the values of rigor.[7] In this context, rigor, openness, and tolerance are the fundamental characteristics of the transdisciplinary attitude and vision. Thus, *rigor* in argument takes into account all existing data and is the best defense against possible distortions; *openness* involves an acceptance of the unknown, the unexpected, and the unpredictable; and *tolerance* implies acknowledging the right to ideas and truths opposed to our own.

One year later, D'Ambrosio was elected the President of the *Inter-American Committee on Mathematics Education* (CIAEM) from 1979 to 1987. This context enabled him to begin his investigations in history, sociology, and education, mainly, in science and mathematics; more specifically, this is when he began to investigate the connections between mathematics, society, and culture.

In 1994, D'Ambrosio retired from UNICAMP. He was awarded with the honorary title of *Emeritus Professor* in this university. However, Ubi continued his research agenda and guidance activities in these areas, in other universities, with more intensity at the *Pontifícia Universidade Católica de São Paulo* (PUC-SP), in the *Postgraduate Programs in Mathematics Education and in History of Science.* D'Ambrosio had also supervised students at the *Faculty of Education* at USP and at the *Institute of Exact and Geological Sciences* at UNESP in Rio Claro, São Paulo. It is important to state here that D'Ambrosio was also the President of the *International Study Group of Ethnomathematics* (ISGEm) from July 1996 to July 2000.

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[6] This document is available online at https://www.iconos.edu.mx/congre3/css/documentoshistoricos/venecia/ingles.pdf, last accessed on July 26, 2021.

[7] This document is available online at https://ciret-transdisciplinarity.org/chart.php, last accessed on July 26, 2021.

4. D'Ambrosio's Role in the Development of Ethnomathematics

D'Ambrosio's remarkable journey was permeated by a diversity of experiences that led him to create the Program Ethnomathematics movement in the mid-1970s. In 1976, D'Ambrosio organized and chaired the section entitled *Why Teach Mathematics?* within the *Topic Group: Objectives and Goals of Mathematics Education* during the *Third International Congress of Mathematics Education* (ICME-3) in Karlsruhe, Germany. In this section, he brought up the discussion about the cultural roots of mathematics in the context of mathematics education [13].

It was first in 1977 that the term ethnomathematics was first used, in a lecture Ubi gave at the *Annual Meeting of the American Association for the Advancement of Science*, in Denver, USA. In 1984, the term ethnomathematics was consolidated in an opening lecture entitled "Sociocultural Bases of Mathematics Education" given by D'Ambrosio at ICME-5, in Adelaide, Australia.[8] This is important, as this is when he officially instituted the Program Ethnomathematics as a field of research [13].

In 1985, D'Ambrosio's article entitled "Ethnomathematics and its Place in the History and Pedagogy of Mathematics" was published in the journal *For the Learning of Mathematics* [5]. According to [11], this article represents the first comprehensive and theoretical treatise, in English, on Ethnomathematics as a program. It is where Ubi's ideas about ethnomathematics truly began to stimulate the development of this research field.

In 2004, Carpenter, Dossey, and Koehler selected [5] to compose part of the National Council of Teachers of Mathematics (NCTM) book entitled *Classics in Mathematics Education Research* [2]. This article was selected for its positive influence on international investigations in mathematics education. This book was collated as a response to a request from the *Educational Materials Committee* (EMC) of NCTM to develop a compilation of articles reflecting the history of research and the important international influences that directly impacted mathematics education. It remains a solid reference to this day.

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[8] The text of this talk is published as [6].

With the international expansion of the ethnomathematics movement, in 1985, the *International Study Group on Ethnomathematics* (ISGEm) was officially created, which fully launched the Program Ethnomathematics internationally [13]. The Program Ethnomathematics is not limited to understanding the mathematical knowledge (*knowing* and *doing*) of peripheral cultures. It seeks to understand the cycle of generation of both the intellectual and social organization and dissemination of this knowledge [5]. Naturally, when cultures encounter one another, there is an important dynamic adaptation and reformulation accompanying this entire cycle, including the cultural dynamic between encounters of individuals and groups [12]. It is clear that through his work encompassing the social, political, and cultural arenas, D'Ambrosio established a deep relationship between mathematics, anthropology, and society.

D'Ambrosio offered mentorship, encouragement, leadership, and dissemination of innovative ideas, concepts, and perspectives involving ethnomathematics around the world and its applications in mathematics education. He was without a doubt the primary leader of the field. His broader view of ethnomathematics accounts for the dialogical transformation of knowledge within and among communities and societies. His epistemology is consistent with Freire's approach; his views of mathematical knowledge are cooperative, dynamic, interactive, and collaborative because he sees mathematics as the result of human activity; and as such, mathematics is not and cannot be static nor ordained.

In 1983, D'Ambrosio was honored with the title of *Fellow of the American Association for the Advancement of Science* (AAAS) for his imaginative and effective leadership in the evolution of Mathematics Education in Latin America and also for his efforts aimed at the development of international cooperation.

Gerdes [10], as well as Powell and Frankenstein [11], stated that D'Ambrosio was considered the intellectual *Father of the Program Ethnomathematics*. In the study conducted by Shirley [14], D'Ambrosio was elected as one of the most important mathematicians of the 20th century, mainly, in relation to social, political, cultural, and anthropological issues through the development of the Program Ethnomathematics.

In 2001, D'Ambrosio was awarded, by *the International Committee of History of Mathematics* (ICHM), the *Kenneth O. May Award* for his important contributions to the History of Mathematics. The award announcement [1] stated that the ICHM awarded this medal to him for his never-ending efforts through writing and lectures that promote ethnomathematics and thereby contributing intensely to the establishment of this research field.

In 2005, D'Ambrosio was honored by the *International Committee of Mathematics Instruction* (ICMI) with the second *Felix Klein Medal* for the recognition of his contributions to the field of Mathematics Education. In 2016, D'Ambrosio was awarded with the title of *Emeritus Member of the Brazilian Society of Mathematics Education* (SBEM) for his contributions to the development of mathematics education in Brazil. Figure 6 shows D'Ambrosio receiving his award from Milton Rosa.

Figure 6: D'Ambrosio receiving his award from SBEM. Source: Picture taken by Edvaldo Tadeu.

D'Ambrosio's contributions to the development of research in mathematics education guided investigators, professors, and students from several universities in Brazil and abroad. His name has been engraved in the History of Education worldwide and will be remembered for a very long time. His professional and academic life were exemplary; he encouraged hundreds of scholars in the paths of the search for peace and social justice through the appreciation and respect for mathematical knowledge developed locally by members of different cultures.

D'Ambrosio paved the way for the development of research perspectives that are sensitive to the social, cultural, and historical contexts in which teaching and learning of mathematics take place. Furthermore, Ubi has always defended the principles, ethics, and values that seek the promotion of quality education that promotes the formation of critical, reflective, and active citizens for social transformation. His concern about ensuring that quality mathematics education is accessible to the entire population and not just a privileged segment of society impacted many scholars and influenced the practice of many others.

5. Preservation, Maintenance, & Expansion of D'Ambrosio's Legacy

One of the main contributions of D'Ambrosio to mathematics education was in how his work made explicit the unique connections between mathematics and cultural dynamics by valuing and respecting different ways of mathematical thinking found across cultures and contexts. He was instrumental in showing us that mathematics is much more than what is taught in academic contexts, or in schools, and that it is used in day-to-day contexts in more flexible ways than previously assumed. To him it is all ethnomathematics, and it is all valuable. This approach made possible the study of mathematics found in diverse contexts, and it created an awareness that members of diverse cultures play an important role in the evolution of the human species. This unique contextization happened through the valorization of the connections between mathematics, education, and local communities.

When D'Ambrosio encouraged us to study, promote, and document alternative forms of comprehension and understanding of diverse mathematical ideas, procedures, and practices developed by members of distinct cultures, he was also aiming for our own empowerment. This approach taught many of us (educators, scholars) that we need to acknowledge that *what* we teach as well as *how* we teach has enormous and profound pedagogical consequences. D'Ambrosio provided, through his example, his leadership, and most importantly his encouragement of researchers, professors, educators, scholars, and students around the world, the motivation and the opportunities for many of us to conduct investigations into the cultural aspects of mathematics we find in our diverse contexts.

As well as leading and boosting the dissemination of these new ideas, notions, concepts, and perspectives involving ethnomathematics, D'Ambrosio promoted and reinvigorated mathematics education [9]. As of late, he was very concerned about the global pandemic situation and stated that:

> We are experiencing a difficult time with this pandemic. There has to be solidarity about that. It is a very strange solidarity to not embrace, but to stay away, to have the distance because we know that this physical distance, in truth, is an intimate, personal solidarity. We are not embracing, but we are embracing, this is respect [9].

D'Ambrosio was considering that, in the context of this pandemic, the very removal of physical contact is an act of solidarity and a form of love for the others [9]. However, he also taught us that this action to combat the pandemic must be conducted in conjunction with:

> (. . .) [m]athematicians and other scientists because they are directing their intellectual capacity and their knowledge to solve this very serious problem of the pandemic. This is the cooperation between all scientific areas, all knowledge fields, and all areas of the humanities [9].

For D'Ambrosio, problems related to pandemics can and should be solved with dignity, respect, solidarity, and in cooperation with others [9]. Thus, it is important to emphasize that:

> (. . .) [t]he path to peace is respect, solidarity, and cooperation. We are all human beings who are part of humanity. And, if we do mathematics, if we are mathematicians, we have to do mathematics for this humanity. It has to be a Humanistic Mathematics, otherwise it will lose its meaning [9].

D'Ambrosio offered us, from an ethnomathematical point of view, a broader view of the pandemic. He explained clearly how the cultural dynamism between distinct societies and communities, through dialogical actions, could transform mathematical knowledge in search of the common good.

This epistemology, in the context of his ethnomathematics program is, once again, consistent with Freire's ideas. As mathematical knowledge is dynamic, it can be determined to be the result of human activity.

In our point of view, in order to preserve, maintain, and expand D'Ambrosio's legacy, we need to continue to examine and extend his philosophy, ideas, and investigations regarding all mathematical knowledge and mathematical practices developed by humanity, indeed the members of other cultures, with respect and appreciation; we need to put aside ideological prejudices about school/academic/local mathematics and look carefully and intentionally at the intimate relationsship between mathematics and culture, so that we are able to understand the aspirations, thoughts, and feelings of all members of our species.

Once, D'Ambrosio commented to us in one of his personal emails that historians and educators alike often use academic sources as a guide and, even so, nostalgia, disenchantment, regret, and everyday tricks are ignored. In this regard, in order to get around these issues, we must rely not just on the local and academic mathematical sources we have been studying, but also on the voices of those who are invisible, and those whose knowledge is often ignored; and we must dig deep until we figure out how we can hear their voices in their cultural artifacts, social relations, behaviors, and traditions.

D'Ambrosio also commented that "it is important to use other sources such as sparse writings and correspondences, diaries, popular periodicals, and almanacs", which he called *latent history*, "which [are] as important as the *manifested history*" [9]. Members of distinct cultures react differently to the events of their daily lives and to the sociocultural conditions they live in, as well as to natural phenomena — even this international pandemic health crisis is a good case study. Thus, they create communicative, analytical materials and/or technological instruments that may help us to develop answers to problems we may be facing in our own diverse sociocultural contexts.

Thus in the context of this global pandemic and in how distinct cultural groups have been responding to it, we can capture instances of the creative flow of humanity. For example, D'Ambrosio highlighted that "the rapid development of vaccines for Covid-19 and the international adaptation of teachers to their teaching practices are examples of these abilities" [9].

In future work, it will be important to discuss how the various strands of research in ethnomathematics interact and intertwine, as researchers engage with specific local communities where members live and work as well as how they interact with global phenomena in distinct and particular ways.

It is also necessary to look at theoretical issues such as how to bring together the political-epistemological basis of the ethnomathematics program with the *Philosophy of Difference*, *Cultural Sensitivity*, and *Alterity,* in search for peace and social justice. This approach opens up new directions for the conduction and development of future investigations in ethnomathematics.

Preservation, maintenance, and expansion of D'Ambrosio's legacy will involve the development of a variety of themes, ranging from the pedagogical action of ethnomathematics to philosophical discussions related to the peaceful uses of mathematics and the sciences that search for peace and social justice. D'Ambrosio's work offers a rich contribution to the broad theme of mathematics within diverse cultural contexts and we expect that it will be influential for a long time into the foreseeable future.

6. Final Considerations

At the beginning of this second decade of the 21$^{\text{st}}$ century, there is a growing sensitivity regarding the understanding and comprehension of mathematical ideas, procedures, and practices that are developed by members of distinct cultural groups. This sensitivity is primarily due to the expansion of studies related to interaction of culture, history, anthropology, linguistics, and mathematics, that is, ethnomathematics. Thanks to D'Ambrosio, discoveries made through ongoing investigations in this research field (both theoretical and practical) show that the internationalization of mathematical practices present in different local cultural contexts is possible.

From D'Ambrosio's legacy, we know that all members of all cultural groups construct and apply their own mathematical knowledge, developed by using distinct cognitive processes that enable them to utilize mathematical abilities; these processes include counting, locating, measuring, drawing, representing, playing, understanding, comprehending, and explaining their political, social, cultural, economic, environmental, and political surroundings.

This knowledge enables D'Ambrosio to share with us his vision, his belief in how fundamentally important it is that the teaching and learning of mathematics value and respect diverse cultural contexts of mathematical knowledge, and how vital it is to connect this cultural aspect to the learning process as an important goal for school curricula. To know and understand the value of the plurality and the nature of socio-cultural-economical-political aspects of diverse peoples and cultures is a necessary precondition so that we can take a firm stand against prejudices based on our wonderfully cultural differences, social classes, beliefs, gender, sexual orientation, ethics, or other social and individual characteristics.

The great challenge for us all during this period of crisis is to be able to deal with conflicts and problem solving, which are intrinsic to life, and indeed, as D'Ambrosio said, to "our survival as [a] species" [9]. In this context, his work emphasizes the undeniable rights of all human-beings to share our amazing and beautiful cultural practices and identities with one another as well as our undeniable rights to the development of our own mathematical ideas, procedures, practices, and the natural goods needed to our material survival and intellectual enhancement and transcendence.

According to D'Ambrosio [8], we must accept, as a priority, the pursuit of a civilization with dignity for all, in which inequity, arrogance, and bigotry have no place, in order to achieve a world in peace. His life goal was to lead us to acknowledge that our responsibility is to offer venues for social justice. In our opinion, D'Ambrosio's life is a response to this call and an example of how to achieve this objective.

D'Ambrosio sought and encouraged new directions of investigation in order to provide innovative forms of mathematics education. It may be particularly interesting to further this exploration of his reflections about globalization, in relation to our myths and religious practices, which are more concerned with their *tics of mathema*. Through his life, D'Ambrosio sought to develop a critical sense that values and respects different ways of *knowing* and *doing*, thus raising the self-esteem of individuals who belong to distinct cultural groups, by promoting the creativity and dignity of their cultural identity. This is the best instrument available to us, one that may lead to a planetary civilization, with peace and dignity for all mankind.

D'Ambrosio acknowledged that throughout history, both religion and sciences focused on giving a sense of normalcy, a sense of humanity and moral direction to our social behaviors. He has shown us that the survival of humanity depends dearly on our relationships to nature, which can be regulated by ecological principles. Thus, to understand our very *human being-ness*, as well as our connection to other species on this planet, depends essentially on the analysis of his proposed triad: *individual-society-nature*, and the sincerity of our respect for the relationships among these elements.

In his personal, professional, and academic life, D'Ambrosio sought peace by proposing a pedagogical action that raised awareness of the connection between mathematics and culture, by aiming toward social justice, as well as by educating for a just society through mathematics education. There are not enough words that adequately describe the importance and relevance of this enlightened human being, who sought harmony among peoples of this world so that together we can transcend to a planetary civilization.

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