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Original Article

Positionality and Creating Dialogue in Nepal: Connecting Ethnomathematics and Modelling - the Importance of Place Through Ethnomodelling

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Abstract

This paper reflects upon the valuable research in ethnomathematics and principally ethnomodelling, with colleagues in Nepal from 2007 to the present. The main objective of this paper is to identify how dialogic approaches using nonkilling mathematics and ethnomodelling contributes to processes of teaching and learning mathematics. In this article, we discuss the connections related to positionality and ongoing research in ethnomodelling in Nepal, this includes what was learned with a Brazilian-Nepali connection used to reflect on feedback and new ideas related to the dialogical processes that allows us to use and create new forms of emic, etic, and dialogical aspects in ethnomodelling. We seek here to integrate and share ideas related to ethnomodelling dialogue gleaned from discussions and work with the emerging ethnomathematics research group in Nepal. We end this discussion with concrete examples of how we continue to learn and apply dialogue in ethnomodelling research in the context of JB Pradhan and Toyanath Sharma´s work with artifacts in Nepal.

Keywords: *Ethnomodelling; Etic, Emic and Dialogical Approaches; Functions Re-signification; Nonkilling Mathematics; Colonization*

Developing an unbiased attitude does not mean we have to think of all paths as equal, as this is simply not true. Each has its own flavor and strengths, and therefore what we are trying to do is develop greater awareness of what diversity has to offer. Our aim is to clearly distinguish between their differences, respecting each as a skillful means to guide different sentient beings towards greater happiness.

- *Khentral Rinpoche*

Introduction, Background, and Context

Orey's first contact with Nepal was as part of an extended research visit to Nepal in 2007, as a collaboration between Kathmandu University and the Fulbright Commission of Nepal. Since that time, we have maintained contact and encouraged ongoing work with colleagues in Nepal in regard to mathematics education, ethnomathematics, and ethnomodelling.

In Hamburg, Germany, in 2016, ICME13 had the good fortune of the participation of Nepali educators in the ethnomathematics research group, two of whom went on to author two excellent chapters in relation to their creative work in *ethnomodelling* for the proceedings of the ethnomathematics research group (see: Pradhan, 2017; Sharma & Orey, 2017).

In a recent talk as part of the inauguration of the Ethnomathematics Research Group in Nepal, Orey began with this quote from Maxine Hong Kingston: *In a time of destruction, create something: a poem, a parade, a community, a school, a vow, a moral principle; one peaceful moment* (Kingston, 2004, 2020). We have come to appreciate this quote because we strongly believe that ethnomodelling, based on the Ethnomathematics Programme as developed by its founder Ubiratan D'Ambrosio (2006), if used wisely, creates moments of peace, where insiders-outsiders come together to create, practice, and strengthen dialogue, and understanding of each other´s viewpoint through investigation and research in mathematics. We will go more into this below.

The work of ethnomodelling and ethnomathematics is ongoing and evolving. Many mathematical and scientific traditions are being revived in diverse places across the planet, and we are proud to attest here that researchers in Nepal are very much the part of this movement that resembles Renascence period. In this context, D'Ambrosio (2011) states that "we are now living in a time which resembles the intellectual effervescence of the Middle Ages. It is this justifiable to speak of a new renascence. Ethnomathematics is part of this new renascence" (p. 19).

In this regard, this work includes the contexts of both higher and teacher education programmes. There is a great

need to connect powerful western mathematical and scientific ideas to peaceful and spiritual or moral aspects of its implementation, and researchers in Nepal are doing this in a research and scientific basis, yet by respecting and valuing local mathematical and scientific knowledges.

Orey´s recent trip to Nepal, allowed him to reacquaint himself with the extraordinary work of the newly inaugurated Nepal Ethnomathematics Research Group, his friends and colleagues at Kathmandu University, Tribhuvan University, the Buddhist University of Lumbini. And at ABI-Nepal[1], he consulted and gave a talk and workshops for teachers. One of the workshops was near to one of the planet´s most sacred places: *Lumbini*, the birthplace of *Lord Buddha*. This trip encouraged him to think even more about positionality, dialogue and communication in relation to how we can create ethnomodelling experiences, from a distinct Nepali perspective. The paper here serves an outgrowth of this reflection.

Our work in ethnomodelling concerns itself with, and seeks to be mindful of, the harm that on-going forms of colonization creates in non-western societies. We are profoundly interested in the positionality of emic-etic perspectives[2] and the creation of deeper dialogue in relation to mathematical modelling phenomena at a local level. We think this is true for educators, learners, and schools in Brasil and in Nepal.

The ideas related to the perspectives of the outsider and insider and how these unique interactions combine to create exchange and dialogue is what is of interest to us here in Brasil. We are seeing it manifest itself in what we are doing at a deeply personal level, as Orey for example, for almost nine years now, is both an insider and outsider (immigrant) in his community in Brasil, and Rosa lived in the United States as Secondary High School mathematics teacher while he earned a masters and doctorate. This last trip to Nepal from Brasil, put Orey in the envious position of being the outsider to Nepali ethnomathematics, and an insider to Brazilian perspectives, while as an immigrant to Brasil he is accustomed to be an outsider at times to Brazilian perspectives and an insider to that of his native United States.

There is no doubt now, that the idea of ethnomodelling can be successfully

examined and applied at both a deep and practical level in numerous locations in the world including the USA (Lewis, 2018), Brasil (Cortes, 2017) and now in Nepal, with the extraordinary work of Pradhan and Sharma. The *ethnomodels*[3] developed by these scholars are of the utmost quality and profundity, and we are very proud indeed to share a few of them below. Because of the fast and growing nature of research being produced in ethnomathematics and ethnomodelling in the unique context in Nepal, we are sure to have missed a few, and in so doing, we beg the reader's forgiveness for any we may have missed. However below are a few that have come to our attention since 2007, and especially after ICME-13 in Hamburg.

In this context, it is important to highlight that mathematics education researchers in Nepal have undertaken a wide variety of work in cultural perspectives, multiculturalism, and ethnomathematics. For example, Luitel and Taylor's (2007) work with the Shenai; which led to some very important work with UNESCO (UNESCO, 2008) that developed important curriculum materials. Some seminal masters and doctoral work were also conducted, most notably, Luitel (2013), Adhikari (2009); Acharya (2015), and Devkota (2013) who have uncovered other forms of ethnomathematics, multicultural perspectives, and culturally decontextualized mathematics education in Nepal.

In this regard, Pant (2017) developed some extraordinary good work, without much mention of ethnomathematics per se, but in relation to thinking and cultural perspectives in the doing mathematics, which is well received indeed. On the other hand, Pant and Luitel (2016) discussed beliefs in relation to the nature of mathematics and its pedagogical influences in classrooms.

We have no doubt that new perspectives in multicultural education, problem-solving, ethnomathematics, and most rewarding to us, ideas related to *ethnomodelling*, are emerging in South Asia. Researchers at both Kathmandu and Tribhuvan Universities can be most proud of the work and emerging voices being created along with the research being produced. With the difficult conditions, the diversity of cultures and the mathematics produced in Nepal, we hope that researchers build on this work, and continue to explore, share, investigate, and publish their findings. In order to share the truly creative and

important perspective emerging from Nepal, we hope that researchers there continue to publish their work in ethnomathematics and ethnomodelling and will participate in the related research groups in various international research conferences.

Work here in Brasil, in 2017 conducted by Diego Pereira de Oliveira Cortes represents the first masters' thesis that we know of using ethnomodelling. His very creative and innovative study looked at how ethnomodelling might be applied in a practical way in a school setting. His work brought together a group of high school mathematics students and a neighborhood farmer seller. And besides forming the data for masters' work he has presented this research in various congresses and published in books and journals in English and Portuguese. To see his work, we invite the reader to see: Cortes (2017) and Cortes et al. (2018). In this paper, we wish to focus on what we have learned from Pradhan and Sharma´s excellent work. His work stands as an exacting and important model for future data collection in ethnomodelling.

However, first, we wish to discuss and or define our view of along with how we use Nonkilling mathematics, ethnomathematics, and ethnomodelling. Nonkilling mathematics is a mathematics-science paradigm built on peace and justice, something the founder of ethnomathematics, Ubiratan D´Ambrosio (2011) links to the ethnomathematics programme. Before we can talk about Nonkilling mathematics, we wish to share our perspective on ethnomathematics and ethnomodelling.

Ethnomodelling / Ethnomathematics

Both current and ongoing work in ethnomodelling and ethnomathematics begins with looking at how diverse members of distinct cultural groups use mathematical thinking. What is common across all cultures is the basic human endowment that is the common way of thinking that allows all people to count, to order, to pattern, to measure, to model (Cortes & Orey, 2020).

The emic/etic dialogue that forms our interest, forms the foundation to ethnomodelling and originated because of current concerns in ethnomathematics concerning the imposition of powerful western academic mathematics and sciences while local languages, religions, customs, science, and

traditions that have served communities for millennia are being erased at an alarming rate, (colonization), and this is occurring before many traditions are documented, shared, catalogued, or saved for the future.

Many of our truly wonderful and diverse ways of counting, reasoning, classifying, ordering, and thinking may seem exotic, strange or even *wrong* for those of us educated in western-academic tradition of science and mathematics. Yet, from an ethnomathematical perspective, they form part of the customs and daily life for millions of people.

> What colonization gave was also taken from many cultures. For instance, while giving access to very powerful mathematics and science, it has also ignored, discounted, and often, erased traditions, mathematics, economics, science, and ways that diverse people ordered, counted, patterned, measured, and modeled their environments. (Cortes & Orey, 2020)

Orey´s ongoing work with understanding how people do mathematics using ideas of ethnomathematics began in the late 1980s, his early work looked at the first contact many educators, parents and learners had with technology via LOGO, as well other forms of technology and the inherent ethnomathematics. This work took him to Guatemala, México, Brasil (where he lives now) and Nepal. Both professors Rosa and Orey have been researching how ethnomathematics takes the "mystical way and walks it with practical feet" (Orey & Rosa, 2016, p. 7), that is how we create practical applications of ethnomathematics, or actually "do" ethnomathematics. So, it is that we continue to explore the many profound, diverse and beautiful aspects of ethnomodelling (Rosa & Orey, 2013) with colleagues in Nepal as well as in our home of Brasil.

As of this writing, Professors Rosa and Orey have a number of graduate students looking at ethnomodelling, modelling, and ethnomathematics in one form or another. Our ethnomodelling and ethnomathematically related ideas previously explored include, modelling a Sioux tipi (Orey 2000), a study with a farmer seller (Cortes, 2017), financial education for deaf students (Pinheiro, 2017), a gym (Bastos, 2019), ethnomodelling in a bilingual Palestinian-Israeli school (Naftaliev & Gara, 2019), and possibly the first

doctoral dissertation in ethnomodelling that looked at the theorization of diverse teaching practices in mathematical modelling contexts through the examination of teacher scaffolding in the ethnomodelling perspective (Lewis, 2018).

A recent collaboration includes the University of Oslo and the Universidade Federal de Ouro Preto who have created a project beginning in March 2020 that looks at aspects of *math trails* in both locations and ethnomodelling of cultural artifacts, monuments, and aspects of out of school mathematics. As well, ongoing ethnomodelling work is related to master's level students who are: exploring coffee production and a very powerful study in a *favela* (slum) in Belo Horizonte, and a future study with relation to regional handicrafts (weaving and soap stone carving).

What is increasingly evident when reflecting on the world around us, the true difficulty is in how we communicate with and respect diverse opinions and new ideas. By refocusing on the moral aspects of how we teach and learn mathematics[4], our teaching has been the cause for us to refocus on how to truly create dialogue in our ethnomodelling work.

The valuable work of the ethnomathematics research group in Kathmandu is producing new perspectives. Their work focuses on how to implement and reflect on various cultural artifacts related to South Asian Hindu-Buddhist perspectives of mathematics, science and peace through the creation of positional dialogue in ethnomathematics, including the peaceful uses of mathematics as described by D' Ambrosio (2011).

We believe that this includes a sense of mindfulness related to what actually constitutes mathematics itself and how to teach it. Discussion related to how we might be able to mindfully empower learners and communities to resolve pressing issues. We increasingly experience this as our student-researchers explore the themes as outlined in the above-mentioned projects. So, what is it exactly that constitutes a *Nonkilling* educational teaching and learning environment?

Nonkilling Mathematics

D´Ambrosio (2011) outlined *Nonkilling* mathematics as mathematics taught in a way that is both rigorous and critical. While at the same time, taking on a form of teaching and learning in a form that is

both positive, and inclusive. By helping participants to look at data, often emotional or angry moments can be transformed into productive opportunities that encourage people to communicate, to share ideas, to solve basic problems in communities, respectfully (Rosa & Orey, 2019). What Kingston (2004) refers to as *creating one peaceful moment*.

> The images of peace are ephemeral. The language of peace is subtle. The reasons for peace, the definitions of peace, the very idea of peace have to be invented, and invented again. Children, everybody, here's what we do during war; In a time of destruction, create something. A poem. A parade. A community. A school. A vow. A moral principle. One peaceful moment. (Kingston, 2004, p. 402)

What both learners and educators notice worldwide is real lack of curiosity and interest in our world around us. This is especially true in regard to mathematics, math fear or avoidance coupled with a passive disregard for the dangerous aspects of the mathematics and science we teach and use. Meanwhile communities across the world are suffering from the effects of numerous health crises, financial disasters, injustices of rich versus poor, environmental degradation, and violence of all types. On 9/11 Orey and Rosa, still in California, knew of professors at their university, who just kept teaching, as if nothing had happened!

Yet, we, in accordance with D'Ambrosio, feel that mathematics can and should be used as an instrument for peace, a discipline where learners using ethnomodelling techniques are encouraged to see the power and beauty of mathematics and its humanizing features by finding how it directly affects their lives and that of their own community. D'Ambrosio (2011) affirms that:

> Particularly in mathematics, there is a general acceptance that if we do mathematics well, thus instilling attitudes of rigor, precision and correctness in the student´s behaviour, we are fulfilling our broad responsibilities. Undeniably true. But this is not enough. This must be subordinated to a much broader attitude toward life and toward how mathematics can be used for good or bad. (p. 133)

This aspect comes about when awareness or a true sense of ethics in the mathematics and curriculum we teach develops and includes:

1) A respect for the other with all the differences (which are inevitable, since the individual and the other are different),
2) Solidarity with the other, and
3) Cooperation with the other (D'Ambrosio, 2011, p. 132).

The work we do in ethnomodelling, seeks to lead our students and research group to look at how diverse groups create dialogue between both their own researchers and practitioners (Orey, 2017; Rosa & Orey, 2019). These dialogues take place when outsiders and insiders encounter each other and create new perspectives (Rosa & Orey, 2013). Our work is showing that these dialogues are allowing all parties to develop a certain sense of mindfulness related to the forms and kinds of mathematics being used. "To create powerful decisions in community life or to solve problems, and perhaps in this dialogue to create peaceful moments in which people can come together to resolve conflict" (Cortes & Orey, 2020).

What is missing in much of the current research in ethnomathematics / ethnomodelling are specific ways in which ethnomodelers construct meaningful dialogical processes and develop an understanding related to the creation and dialogue between two or more diverse groups in a mathematical context. What we feel is especially important in creating these dialogues is how they occur in a respectful climates of *tolerance*, *receptivity*, *curiosity*, and *flexibility*. That is, when we bring a sense of mindfulness to the activity, this includes respect for diverse perspectives, and curiosity. This also includes the implementation of dialogue in diversity, where alternative points of view come together to look at the data and create more new perspectives by developing a sense of *alterity*[5].

Recently we read an article, that presented a powerful argument, not necessarily related to mathematics, but instead for the creation of peaceful dialogue, that offers a valuable perspective here (Rinpoche, 2019). Here he offers us a tool for dialoguing, or at very best, he has offered, or outlined four aspects:

> (…) that we can be mindful of as we develop strong dialogically based

> ethnomodels. In his practice related to the importance of diversity and unity, we see how this offers a guideline to structuring dialogue in resolving conflict or solving problems in mathematical contexts in our work. In creating dialogue, he speaks of four areas: tolerance, receptivity, curiosity, and flexibility in thought. (Cortes & Orey, 2020)

Here, we'd like to us take a moment to briefly outline these four areas, and then connect them to aspects of dialogue and ethnomodelling through what we observed in Nepal with work published by the Ethnomathematics Research Group (Sharma & Orey, 2017; Pradhan, 2017). First are four areas that Rinpoche (2019) has outlined, that we seek to bring to the attention of the reader.

Tolerance

Tolerance is built upon built on a foundation of mutual respect. It includes the ability to connect to the other person in a manner that even if we do not agree with their particular view, we respect it, indeed it creates a climate where we come to value their right to hold diverse views. Tolerance makes it possible to establish a basis for connection with another person or set of ideas. What many of us encounter when sharing work in ethnomathematics, is a certain sense of *intolerance* towards ancient, local or informal forms of mathematics and science.

In many places, especially in Academia, only the research and voices from North America or Europe are valued much higher than that of Latin America or in this case, South Asia. This is still occurring despite over 500 years of colonization where thousands and thousands of scholars have been trained and then returned to their homelands. It could be that new ideas, indeed forms of mathematics and science are awakening from ancient non-western traditions or coming out from unique ecological or socio-historical contexts.

In the context of his project, both Sharma and Orey (2017) and Pradhan (2017) used aspects of ethnomodelling in their pedagogical actions. Both of them demonstrated in their work how they came to respect and to truly listen to alternative views and perspectives on the objects they were mathematizing. A more tolerant perspective leads both teams to more openness and receptivity to new or innovative possibilities found in *dhol* and *dhyangro* drum construction processes.

Receptivity

Rinpoche has taught that all forms of communication involve the transmission of ideas and the reception of new ideas. A basic tenant of any given pedagogy seems to be that the central or main focus of educational experiences are on the acquisition of new information. If done correctly, ethnomodelling cultivates a deeper *quality* of receptivity of new ideas, as modelers begin to discuss their findings. In the context of fake news and a growing intolerance, creating a push and pull in an ever-confusing world of our learners, still being receptive to alternative possibilities created by "others" allows us to differentiate between fake and real data, science, research, is important now more than ever.

Being receptive to the myriad of moral and spirituality-based perspectives in data selection, might cause researchers in ethnomodelling to rethink what they are both finding and doing. This is, without a doubt, vitally important. It is especially true in the context of the huge disparities between the rich and poor, for example; or the current debates centered on the environment and climate change. Cultural issues addressed from an ethnomathematical perspective, hopefully can guarantee a true sense of mindful effectiveness. This is especially true when special care is taken to use unprejudiced data selection methods that value (in their own voices) and distinguish between individuals from different cultural groups and contexts.

Becoming receptive to the perspectives of the drum makers and users, Sharma and Orey (2017) and Pradhan (2017) realized how the objects were produced, how the builders calculated, measured, and decorated the objects. The reader of both works is clearly able to see, in a direct manner, just how the forms of mathematics are used in alternative contexts of two groups of people (Chundara and Rai) in Nepal.

Curiosity

When around preschool children, we see that young people are intensely interested in the how and why things work. I have counted the use of the word "why?" over a dozen times with our four-year-old grandson for example. When very young people encounter new ideas, there is a true curiosity, indeed hunger for more answers. When new ideas are introduced to the child, a process occurs where the child's mind tries to reconcile what this new

information means in relation to previous or existing ideas. This is why they love stories about magical and fictional characters. An inquisitive mind desires to understand, and is in direct reaction to uncertainty, or a sense of wonder and awe.

In our travels we have noticed that what teachers in numerus locations in the world lament is a true lack of curiosity or engagement in their students and, sadly enough, even their colleagues. Because of this phenomenon, we have become intensely interested in how we might assist learners to appreciate uncertainty and in the case of ethnomodelling, create opportunities where we engage the creativity and perhaps create new understanding in learners. That is why when Rinpoche talks of creativity, it also had a direct connection to mathematics education and ethnomathematics/ethnomodelling.

Researchers in both Brasil and Nepal have shown that by engaging students in problems that affect them, and where they can see direct applications that are very real, this increases curiosity and a need to know more about mathematics. It is akin to learning a video game, where to solve the problem the participant MUST learn a new skill!

Educators worldwide are regretting a lack of interest or curiosity in learning mathematics. Sharma and Pradhan's students demonstrate a very high level of motivation and curiosity towards sharing diverse Nepali perspectives of counting, time, patterning and construction. They are creating powerful ethnomodels that describe the context of the artisan, and how they find materials, using their own local forms of mathematics (measurement) and design and build the drums. Their colleagues and students demonstrated high levels of curiosity, excitement and true sense of in pride in Nepali culture, while coming to see the beauty of the mathematics in their community as something that is very much alive, and useful.

Flexibility

According to Rinpoche mutual acts if tolerance, receptivity and curiosity combine together to acquire even more information related to the world around us. All people cultivating these qualities are like sponges, pulling in as much as they can whenever they can. This is because theses learner-researchers engage actively in dialogue that allows them to constantly clarify their understanding. And thus, very much

includes how the quality of their view will be very strong and very broad.

It goes without saying, and this is true for non-mathematicians as well, as many ethnomathematicians learn about diverse approaches, to similar problems, the more flexible and open of mind they are, the more the see both insider and outsider perspectives, they are better suited to grasp new perspectives, and see the deeper meaning and opportunity presented by emic-etic dialogues. Exposing the mind to a wider variety of experiences creates a more mindful form of awareness.

In this regard, Rosa (2010) has argued that teaching mathematics only for college entrance exams, or a curricula based on what students need in order to pass exams, misses the point and is not enough to make meaningful and positive change in society. It only results in an increase in passive disinterested, bored and disconnected learners, who are at risk of being manipulated by fake or false science and information. Instead we must create *sponges* where we are eager to learn and exchange new ideas! Maybe even create new forms of mathematics (Cortes & Orey, 2020).

How Two Researchers in Nepal Created Dialogue Using Ethnomodelling Perspectives

During the functioning of a daily farmer´s market in Brasil, Cortes (2017) found that it was possible to recognize the development of local mathematical practices and then model them by making use of ethnomodels. Ethnomodels are the representations composed of small units of information that allow us to interpret and understand the reality of the mathematical thinking produced by the members of distinct cultural groups (Cortes, 2017; Cortes et al., 2018; Cortes & Orey, 2020; Rosa & Orey, 2019).

Using the same ethnomodelling paradigm we used above, we would like to take this opportunity to reflect on this in regard to work done by Pradhan (2017) and Sharma and Orey (2017) in their own ethnomathematics research groups. As two Brazilian non-Nepalis, we feel explaining to the readers here the intricacies of Chundara and Rai culture and their truly beautiful mathematics would be foolish if not dangerous on our part. What Pradhan and Sharma have shown us is a glimpse into these two cultural groups and their mathematics,

this is best left to the emic (insider) voices presented in the ICME-13 monographs written by the authors. But we would like to reflect here on the work presented about their work and research and how both Pradhan and Sharma applied emic-etic dialogue to enable us to come to see some aspects of and be introduced to the profound possibilities for further research in ethnomathematics in Nepal.

Chundara Perspectives and Possibilities

Pradhan (2017) has shared his work in relation to how Chundara artisans generated new knowledge in relation to the mathematical ideas that were both embedded and used in the construction of wooden artifacts. What is of particular value is his discussion in relation how the artisans transformed a truncated cone to a cylinder in the construction of drums. His excellent appendix shares with the reader the unique measurement units: haat, bitta, kuret, and amal, used by the artisans in their work. He has provided an excellent and very detailed article related to Chundara that we hope serves as a future model for documentation of other artifacts from an ethnomodelling perspective.

Rai Cultural Artifacts and Possibilities

Sharma documented how the ABI[6] Nepal is working at taking artifacts in local community contexts and mathematizing them and connecting them to teacher professional development. ABI Nepal works for developing learner centred curriculum, teachers' professional development, resource development, plan and policies for school. ABI constructs of school-based curriculum, teacher development programmes, resource development and supply, school improvement plans and other programmes for school activity and improvement. They do this from an ethnomathematics perspective by using local contexts and artifacts. They are creating ethnomathematics lab activities using cultural artifacts in the school community. In his article (Sharma & Orey, 2017), the authors outlined one excellent example of Rai artifact construction being used in one ABI context.

In Conclusion

Being mindful of how we create a climate of tolerance, receptivity, curiosity, and flexibility in *emic-etic* based dialogue is essential for creating

ethnomodels (Cortes & Orey, 2020). Teaching both learners and educators to focus on data that they themselves may have created is a powerful opportunity to foster forms of nonkilling mathematics in Nepal. When researchers in Nepal come to create, focus on, and mindfully discuss the perspective, findings, and learn to value and listen to and critique alternative perspectives is a form of nonkilling mathematics at its very best.

More often than not, thousands of educators and learners in Nepal experience mathematics as something mind numbing and dull. Like Brazilians they too are stuck in a purgatory like that of learning English grammar and never ever having the opportunity to write an essay or a poem. This is exactly how most learners have come to see mathematics – they may know the mind-numbing grammatical details, but rarely get the opportunity to write w mathematical poem (model). The ethnomodels that Sharma and Pradhan have and continue to develop are mathematical prose of the highest order! And to our minds, present us with very fine practical examples of nonkilling mathematics.

In the case of Sharma and Pradhan´s group of researchers, ethnomodelling-based sociocultural perspectives contributes to the growing ethnomathematics database that is growing in Nepal. Looking at how a group of Chundara and Rai artisans perform their own mathematical practices, in this case the mathematics observed was related to diverse practices of related to counting, measuring, comparing, classifying, and even modelling. The activities performed by the artisans offer an "environment full of ideas, notions, procedures, and mathematical practices inherent to the crafting and musical process" (Cortes & Orey, 2020).

In our work, we are coming to see numerous examples of how ethnomodelling encourages a sense of development of mathematical activities that originate in the sociocultural context of the school - community. We invite more researchers in Nepal to create even more opportunities. This is possible because of dialogical development between the:

> Ideas, notions, procedures, and mathematical practices intrinsic to the farmer seller mathematical processes (emic) and the school mathematical contents (etic) with the use of problem situations that

> emerged from the context of a market free in an encounter of distinct cultures (dialogical). (Cortes & Orey, 2020)

The sociocultural perspective of ethnomodelling provides us with an integrative approach to the school curriculum, which in addition to considering it an etic (outsider) approach to mathematical knowledge, recognizes what is truly necessary in the context of the emic (insider) characteristics of the knowledge. We have been privileged, through this approach to see diverse groups of teacher-researchers' and learners come to understand and become more respectful, connected, real and holistic (dialogical) researchers of cultural information for members of different cultural groups that make up the school community. This is the essence of what Ubiratan D'Ambrosio talks about in his philosophy of peace, ethnomathematics, and Nonkilling mathematics.

> Whatever *merits there might be in this endeavor, may they help alleviate the suffering of all beings; may they help us humans to create a more peaceful world.*
>
> *Thumpten Jinpa*

Notes

[1] Activity-Based Instruction Project (ABI) has been working with teachers in Nepal to upgrade curriculum and instructional practices for mostly rural public schools.

[2] Etic perspectives or approaches refer to the interpretations of aspects of another culture from the view or perception of those who observe it, that is, outsider viewpoints (How we think they do it). Emic perspectives or approaches seek to understand specific culture based on the insider views (this is how we do it) or on their own worldviews or cosmologies (Rosa & Orey, 2012).

[3] Ethnomodels are rooted in sociocultural contexts and are represent small units of information used in the interpretation and understanding of the reality of the members of distinct cultural groups. The translation between emic and etic approaches can be carried out with the elaboration of dialogical ethnomodels that consider sociocultural influences in the ethnomodelling process (Rosa & Orey, 2019).

[4] This includes the "how and what" we teach – how we teach creates casts, levels, and in and out groups; what we teach and learned is often determined by outside influences – local, state and federal governments, text book publishers and history and culture.

[5] Alterity derives from the Latin word alter, which is a philosophical term related to otherness. It is generally taken as the philosophical principle of exchanging one's own perspective for that of the other. In this regard, alterity refers to the state of being that of the others and diversity. It contains concepts like difference and otherness within itself. Hence, it is important that difference and otherness are unpacked to begin understanding alterity and the cluster of meanings associated with otherness (Levinas, 1970).

[6] Center for Activity Based Instruction Nepal.

Disclosure Statement

The authors declare that no potential conflict of interest exists.

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