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EMERGENCE OF MATHEMATICAL THINKING IN A COMMUNITY OF OLDER ADULTS

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Abstract: This research seeks to describe the mathematical practices that a community of older adults has through their savings and purchasing strategies, thus identifying and emerging their mathematical thinking supported by the Etnomathematics program (D`Ambrosio, 2012).
The above is ascribed to an emic perspective that discovers how actors categorize, order and organize sociocultural and economic phenomena in their minds, from which the Ethnomodel emerges - which is a valuable primary data of the sociocultural experience that generates transformations and variants. This is how the actors ratify their sociocultural contexts.
Keywords: Community of Older Adults, Ethnomathematics, Ethnomodel, Mathematical Thinking,

PROBLEM STATEMENT

Today in a globalized, capitalist and multicultural world, different realities are observed and manifested: social, cultural and economic; All of these differ sharply between the Underdeveloped or Subaltern countries and the Central or Underdeveloped countries, the latter have always been in a constant imbalance of opportunities in terms of the distribution and circulation of goods; because the first deliver and the second extract. This clearly colonialist scaffolding dichotomy can be seen reflected in a great ethno-cultural disparity, which directly affects so many ethno-cultural, social and ontological aspects of our atomized private-political reality.

In Chile this situation is still different, the biting colonialism imposed for decades in Latin America has led to abrupt changes of governments, using military force as an absolutist emblem of civil dominion and control. A case to highlight is the overthrow of the legitimate government of President Salvador Allende in 1973. This incident established a new political, social and economic system, thus managing to deepen and strengthen neoliberalism in multiple logical areas of society. In this sense, the country experienced macro-structural and micro-structural modifications, promoting extractivist capitalism; going from being a country in the process of industrialization to being a country that exports raw materials. This new political reorganization, which by the way will be the signature that will permeate the future of the country, can be observed in the failed socioeconomic model implemented by the authoritarian regime imposed de facto by the military dictatorship. One of the immediate repercussions of this new Estrado regime was the change in the social security system, which was modified, with the excuse of improving coverage, service and old-age pensions for the population. In the words of Quiroga:

> "In 1981, the dictatorship implemented a radical reform of Chile's pension system based on the construction of a private individual capitalization scheme [...]The system that garnered so much praise in the world (...) does not seem to have benefited from high growth economic of the country, which generates increasingly greater inequalities"[1]

In this sense, the Military Dictatorship modified the social security system in 1981 through a reform, transferring the responsibilities of this universal right to private companies in charge of managing the funds of each worker for the rest of their life. In general, since the system was implemented, it is the communities that have suffered the debacle of their savings month after month, thus decreasing the quality of life of older adults and causing uncertainty in various social factors. Therefore, today it is a reality

1. Quiroga, Y. (September 5, 2008). The pension system in Chile. Obtained from El nuso: http://nuso.org/articulo/el-sistema-de-pensiones-en-chile/

that communities of older adults in Chile lack the necessary resources to pay for different social aspects such as: health, education and food. Indeed, as Thumala states:

> When population balances are altered, structural and everyday uncertainties multiply. The deficits cannot be covered by domestic possibilities [...] This warns of new challenges and threats that must be overcome, especially when new life possibilities generate needs and expectations that "objectively" could not be covered with current institutional facilities nor confront with traditional resources[2]

As it can be seen in the previous quote, it is important to recognize and demonstrate that not only population balances are affected by the uncertainties of an inefficient system, but also older adults, harmed as a displaced social group and in constant anomy, They live a reality that is different from the rest of the population, this is caused by the scarce economic resources received from the social security system that is currently implemented. That is why we will delve into the study of the savings and purchasing behaviors and strategies that older adults have in various everyday mathematical situations, which will help us identify, understand and revalue the implicit mathematical knowledge involved in every practice carried out in savings and purchasing contexts.

Through this problem we will address the socio-epistemological and Ethnomathematic question about the knowledge emanating from the members of these communities of older adults, seeking to identify the mathematical practices that older adults possess when facing multiple situations of daily life and in turn; resurface and revalue the mathematical thinking of these age groups.

THEORETICAL FRAMEWORK

ETHNOMATHEMATICAL PROGRAM

This research is assigned to the ETNOMATHEMATICS PROGRAM, which is characterized by having a democratizing view of knowledge, recognizing and valuing the multiple forms and conditions of creating mathematical knowledge; It is a sociocultural current in Mathematics Education that problematizes the urgency of considering communities as entities that generate mathematical knowledge, practices and thinking. It is worth highlighting the importance of the pedagogical implications that the Etnomathematics Program has, promoting from within and outside the curriculum other ways of doing and/or thinking about mathematics in various contexts. A concise definition of the Ethnomathematics Program was proposed by D'Ambrosio,

> The ethnomathematical program implicitly criticizes the teaching of mathematics in schools for being at the service of a technical and commercialized society that excludes powerless minorities. Another world, less exclusive, is possible and desirable; An engine for change is in education, in school, in the curriculum, in the mathematics that is taught and learned.[3]

That is why Ethnomathematics plays a predominant role in the decentralization and democratization of knowledge, it is through the study of ethnos where the various ways and conceptions of understanding the world lie, these mathematical practices being those that help us conceive the mathematical thinking of the communities, which is why it is proposed that ethnomathematics are not unique but infinite, each ethno has different

2. Thumala, D., Arnold, M., Massad, C., Herrera, F. (2015). Social inclusion and exclusion of older people in Chile. Santiago: SENAMA – FACSO U. of Chile. Editions National Service for the Elderly, P. 12.

3. D'Ambrosio, U. (2014). The conceptual bases of the Ethnomathematics Program. Latin American Journal of Ethnomathematics, 7(2), pp. 100-107.

ways of generating mathematical knowledge depending on their environment and their needs. Thus, from a situated thought we can see how communities fail to generate clear cognition about institutional knowledge, which throughout history has been implanted in a hegemonic way over communities, without considering the different contexts and conceptions. existing among the most invisibilized as sub-alternized in society. This has reduced and continues to produce an increase in the marginalization and invisibility of other mathematics, denying that symbolic cultural value to many cultures and micro-cultures.

ETHNOMODEL

The general motivation of this research was to establish the emerging ethnomodels of a community of older adults, systematizing the data collected in this study. It is worth noting the importance of the analysis in which mathematical thinking emerges demonstrated through mathematical practices that describe and manifest the decisions that In this case, the challenges of savings and purchases are taken around a mathematical situation. Likewise, we must not only pay attention to the practices that are executed but also to the strategies that are used to solve various mathematical situations; It is through these strategies that we can identify and understand mathematical thinking as an emergence of community members. Consequently, mathematical practices and mathematical thinking facilitate the study of ethnomodels, which allow us to access and understand, from the actor's point of view, the meanings that he assigns to certain phenomena. In short, ethnomodels are individual expressions of collective representations belonging to a sociocultural system, which reveal how the actor perceives, conceptualizes and symbolizes his reality.

The aspects addressed in this research are the following:

i) General code categories: savings strategies of community participants.

ii) Data expansion: global vision of savings techniques by the community to obtain resources.

iii) Interpretive analysis: categories of phrases and specific conceptions.

METHODOLOGIES

Ethnography plays a predominant role when we talk about ethnomathematical studies, through it it is possible to collect, systematize and generalize the data collected. In general, ethnomathematical studies without the science of ethnography would not achieve the proposed objectives.

To address this work, it was decided to consider the ethnographic strategy proposed by Goetz & LeCompte, including the following phases:

1.- Initial exploration.

2.- Location of the study population.

3.- Obtaining instruments to collect information.

4.- Immersion in the community.

In methodological aspects, this research focuses its attention on the problem related to the low economic resources that older adults receive today in Chile through the arbitrary dominant social security system. Consequently, due to the difficulties experienced by the age group in question, we will problematize the ways of organizing and structuring knowledge, relating the lack of economic resources and the solutions that they provide to pay for the basic needs that daily life implies. Through the focus-group technique and the field study, the necessary data was collected, in which questions arose that delved into everyday situations

of savings and purchases. Consequently, we will familiarize ourselves with the technical-specific language of the environment in order to provide the meanings that these acquire in savings and purchasing practices. Therefore, the analyzes of the data collected in the field study allow us to organize, manipulate and recover the significant segments that provide us with the necessary signs to represent the ethnomodels.

MAIN RESULTS OF FIELD RESEARCH

A. Ethnomodel 1 "Be cautious."

B. Ethnomodel 2 "Buy what is necessary."

C. Ethnomodel 3 "Being Realistic"

CONCLUSIONS

In this research, it has been possible to appreciate how the context and the environment influence and express the ways of thinking mathematically that the actors have to carry out their savings and purchase challenges. In summary, we can speculate that the experiences of the actors have features of inner language that manifest as a means of revealing thought, since the mathematical thinking that the community of older adults described in this article has become evident in the emergence of ethnomodels. study.

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