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Exploring Transfer Science Literacy from *Nanay* to *Mga Bata*: An Ethnopedagogy Research

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Abstract. Barangay Dagbasan is located in a mountainous area in Mabinay, Negros Oriental, Philippines. The people here typically have land surrounding their homes, where they grow a variety of *utan* (vegetables) like alugbati, malunggay, sayote, sili, avocado, guava, papaya, mango, star apple, and cilantro, as well as *tambal* (medicinal plants) such as gabon, tigre-tigre, mayana, ginger, turmeric, and yellow ginger. This phenomenology qualitative research explored the transfer of scientific knowledge through ethnobotany. The people belong to the Aeta and Bukidnon tribes and speak Cebuano. In-depth interviews as the research method was conducted to ten key participants (90% female) revealed the result that mothers (*nanay*) transfer scientific knowledge about planting and herbal medicine to their children (*mga bata*) through folk songs (e.g., the *Bahay Kubo* song), hands-on activities, storytelling, and direct experiences with *tambal* to treat illnesses. Filipinos embrace the philosophy of *"laging handa"* (always prepared), with *nanay* exemplifying resilience in the face of adversity. In conclusion, women in the Philippines are empowered, occupy essential societal roles, and enjoy relatively equal status to men. The country has strong laws and policies supporting women's work, wages, and entrepreneurship, with no legal barriers to equal pay or job opportunities. Many women are the backbone of their families. In Filipino households, *nanay* is vital in guiding children to learn basic science, such as botany, through real-life, hands-on experiences in their everyday lives in the barangay.

Keywords: Botany; Ethnopedagogy; Literacy; Phenomenology; Philippines; Transfer knowledge.

1.0 Introduction

Globally, there is a growing recognition of the importance of indigenous knowledge systems in addressing environmental sustainability, healthcare innovation, and educational reform. The Philippines is an archipelagic country rich in culture and natural resources. The Philippines is divided into three major regions: Luzon, Visayas, Palawan, Mindanao, and Sulu. The country comprises approximately 7,000 islands. Philippine flora accounts for more than 12,000 species, with around 1,500 medicinal plant species used by Indigenous Peoples (IPs) and herbalists (Dela Cruz & Ramos, 2006). Integrating ethnobotanical knowledge into the education system offers a pathway to cultural preservation and scientific literacy. National efforts to indigenize curricula reflect a movement toward more inclusive, place-based learning.

Ethnography has long been regarded as valuable for understanding and documenting traditional knowledge, rituals, and beliefs. One of its branches is ethnobotany, a multidisciplinary field encompassing systematics and taxonomy, pharmacognosy, pharmacology, phytochemistry, ecology, and conservation biology. In the Philippines, ethnobotanical knowledge continues to be preserved and practiced within communities. The earliest records of medicinal plants in the country were written by Spanish missionaries, including Father Francisco Ignacio Alcina and Fray Jose de Valencia in 1669, and Father Pablo Clain in 1712 (Batug, 1954, as cited in Cordero et al., 2023). The fusion of ethnobotany and science education provides a unique lens to explore the interconnectedness of culture, biology, and learning. In 2019, Angeles-Agdeppa et al. noted that a typical Filipino diet generally includes rice with meat or fish, along with *utan* or vegetables. There are more than 76 edible plant species across 62 genera and 36 botanical families, including members of the Zingiberaceae family (Buenavista et al., 2022).

This study embarks on a journey beyond traditional pedagogy. It seeks to explore how the inherent wisdom of local communities in Barangay Dagbasan, Mabinay, can enrich learners' scientific knowledge and foster a deeper appreciation for the cultural heritage of the Philippines. By embracing ethnographic research methods and focusing on applying ethnobotanical dietary practices in science teaching, the study aims to bridge the gap between traditional wisdom and modern education, leading to a more holistic and culturally responsive approach to science instruction in the country. Avila (2020) emphasized that the Philippines possesses a strong ecological footprint and rich local wisdom, which can be highlighted through indigenous processes that provide a model for contextualizing sociological, cultural, and historical perspectives as an ethno-pedagogical strategy for integrating nationalism into social science education. The following sections will delve into this groundbreaking study's methodology, findings, and implications, shedding light on the transformative potential of science education and cultural preservation in this dynamic and diverse nation.

2.0 Methodology

2.1 Research Design

Figure 1 explains the research design as the researcher employed Interpretative Phenomenological Analysis (IPA). IPA explores in detail how participants make sense of their personal and social worlds, and the meaning particular experiences, events, and states hold for them. This method involves a detailed examination of the participant's lifeworld, personal experiences, and individual perceptions to produce an objective statement about the object or event itself (Kahija, 2017).

Figure 1. *Research Design*

Thematic analysis was used in conjunction with IPA to analyze the data. All interviews were audio-recorded, transcribed verbatim, and coded manually. Following Braun and Clarker's (2006), six step approach to thematic analysis, the researcher: (1) familiarized herself with the data, (2) generated initial codes, (3) searched for themes, (4) reviewed themes, (5) defined and named themes, and (6) produced the report. As with any phenomenological approach, the resulting data were categorized (Patton, 2002). In this study, the data were categorized into two main themes: (1) the life history of the *nanay* (mother) and (2) the transfer of ethnobotanical knowledge. The first theme focused on the stories, interpretations, and relationships of the *nanay* (mother) with her family. The data were gathered through interviews and observations.

2.2 Research Locale

Barangay Dagbasan, located in the municipality of Mabinay**,** Negros Oriental**,** Philippines. The study focused on this barangay's residents, particularly mothers (*nanay*), and explored their knowledge transfer practices related to ethnobotany and science education.

2.3 Research Participants
Nine mothers (*nanay*) from Barangay Dagbasan, Municipality of Mabinay, Negros Oriental, Philippines.These participants were interviewed in depth. The research aimed to explore how these mothers transfer ethnobotanical and scientific knowledge to their children (*mga bata*) in their community.

3.0 Results and Discussion

A barangay (pronounced ba-ran-guy) is the smallest administrative unit in the Philippines—similar to a bario, ward, or district in urban areas, and generally equivalent to a village in rural areas (Moeran, 2021). Dagbasan is a barangay in the Municipality of Mabinay, Negros Oriental. In this research, 90% of the participants were female, and all had reached the primary education level. According to the 2020 Census, the population of Barangay Dagbasan was 2,573, representing 3.10% of the total population of Mabinay. The people in this barangay mostly live in simple homes, either permanent or semi-permanent. These homes often lack tiles and typically have cement floors or plastic carpets. Around the houses, there are small gardens or yards filled with various plantations, including both flowers and edible plants.

3.1 Ang Halaman Doon Ay Sari-Sari (The Life History of Nanay or Mothers)
The female participants in this study shared stories from their past, highlighting the extraordinary resilience of women, particularly mothers. One *nanay* recounted how her father passed away when she was very young, leaving the family in poverty. They would graze in the gardens and rice fields for their daily food to survive. "*My father died very early, he was still in his thirties, my father died, so we never finished school*." (F-AA.01) They could not afford meat or fish, nor could they see a doctor when they were sick. Instead, they grew their food for consumption and used homegrown crops for treatment. This knowledge was passed down from her *nanay*. The *nanay* taught her children (*mga bata*) about the types of vegetables they could cultivate around the house, how to care for them, and how to harvest and store them. She also taught them about medicinal plants. The lessons began when the children were 5-6 years old, with hands-on experiences in the fields, gardens, and courtyards. The medicinal plant teachings became more formalized when they reached junior high school.

This narrative from the female participants powerfully illustrates key aspects of science literacy, particularly through lived experiences and intergenerational knowledge transfer. "*We get the knowledge from the elders. They shared to us since we were kids, they demonstrated how to plant and to made herbal medicine*" (F-M.08). The active role of the *nanay* in teaching her children about cultivating vegetables and using medicinal plants highlights her crucial contribution to science literacy in the community. While informal, this educational practice ensured that vital survival skills and an understanding of the local environment were passed down to children at an early age. This knowledge transfer is standard in many traditional societies, where elder women often serve as the primary educators, passing on essential survival skills (Brown & Kulig, 2012).

The same *nanay* raised five children alone after her husband passed away. She followed the same approach her *nanay* had used to teach her children how to survive. Over time, three of her five children graduated from college and found work, with one of them becoming a permanent high school teacher under the Department of Education (DepEd). Another participant shared a similar experience. Although she had a husband, he was in poor health, and there was a time when the family struggled immensely. Despite these hardships, she remained proud of her children. During this challenging period, she planted many edible plants around her home. These plants were also used for medicinal purposes when a family member fell ill. She even taught me a song beautifully illustrated how Filipinos nurture and pass on knowledge about edible and medicinal plants. Today, dietitians and pharmacists are returning to learn about ethnobotany and ethnomedicine because our ancestors already understood the local knowledge of what Mother Earth provides and what God has given us to survive. Despite her husband's health issues and family struggles, the participant took proactive steps by planting edible plants, demonstrating the application of practical botanical knowledge to ensure food security. This proactive approach highlights a form of applied science literacy driven by necessity and the desire to improve their situation (DeShazo & Fisher, 2014; Eisenstein, 2013).

A popular folk song for children in the Philippines beautifully describes life in the barangay (village). People in the barangay typically have a small backyard or front yard where they plant vegetables or trees. The song, "Bahay Kubo," which means "small hut," is one that *Nanay* often teaches her children. "*My lola (grandmother) usually sang to me, Bahay Kubo, to explain how we need to tanom (plant) vegetables around the house. What kind of*

particular plants could we take care of in that song? (F-AA.03) The other participants also said they were familiar with this song. One participant remembered back in their time in kindergarten, "*Maam Marcela, my kindergarten teacher, asked us to bring seeds from home, plant at school, and we named it 'gulayan sa paaralan'*" (F-EE.06)

Bahay kubo, kahit munti	*Nipa hut, even though it is small,*
Ang halaman doon ay sari-sari,	*The plants that grow around it are varied*
Singkamas at talong, sigarilyas at mani	*Turnip and eggplant, winged bean and peanut,*
Sitaw, pataw, patani	*String bean, hyacinth bean, lima bean*
Kundol, patola, upo't, kalabasa	*Jackfruit, sponge gourd, white squash and pumpkin,*
At saka mayron' pa, labanos, mustasa	*And there is also radish, mustard,*
Sibuyas, kamatis, bawang at luya	*Onion, tomato, garlic and ginger*
Sa paligid-ligid ay puno ng linga	*And all around are sesame seed*

3.2 The Ethnobotany in Dagbasan (Science Local Knowledge) Utan (Vegetables)

In Barangay Dagbasan, people commonly use edible plants to prepare their daily meals, such as soups or stir-fries. The edible plants found in Dagbasan include sugarcane, corn, peanuts, eggplants (*talong*), vegetable pear (*sayote*), taro roots (*bisol*), moringa leaves (*malunggay*), string beans (*batong*), breadfruit (*kamansi*), green pepper (*espada*), coconut, black beans, guava (*bayabas*), fig (*labnog*), sambong (*gabon*), tiger-tiger, ginger, lemongrass (*lemoncito*), spinach, *labana*, bottle gourd (*upo*), pumpkin (*kalabasa*), bitter melon (*ampalaya*), pepper (*sili*), soursop (*guyabano*), hibiscus (*antulang*), *hagonoy*, oregano, water spinach (*kangkong*), malabar spinach (*alugbati*), peperomia (*sinaw-sinaw*), asthma weed (*tawa-tawa/saling kapaw*), avocado, papaya, banana (*saging*), *tsupada*, and lemongrass.

According to other research, there are about 76 edible plant species in the Philippines, and in this study, 37 species were found growing in the houseyards of the Dagbasan community. An ethnobotanical study documented the use of 62 edible plant species by the Matigsalug-Manobo tribe in Bukidnon, emphasizing the role of traditional food systems and agrobiodiversity in food security and sustainability. Another study focused on the Higaonon tribe in Bukidnon Province, identifying 76 edible plant species and highlighting their importance for food security and resilience in the face of challenges to rice cultivation (Backlan, 2018). These findings underscore the significance of traditional food systems, the rich agrobiodiversity at the local level, the deep ethnobotanical knowledge held by the community, and the potential of these practices to contribute to food security, sustainability, and resilience.

3.3 Tambal (Herbal or Traditional Medicine)

Traditional medicine plays a crucial role in healthcare systems, with medicinal plants being one of the most common practices (WHO, 2015, in Cordero et al., 2023). This research finds that, in Dagbasan, a rural area, medicinal plants have been used for generations. Eusebio and Umali (2004 in Cordero et al., 2023) explain that Filipinos' use of medicinal plants dates back to before Spanish colonization and may have been influenced by Chinese traders. In rural areas like Dagbasan, the reliance on medicinal plants often arises from the limited access to and affordability of modern healthcare and pharmaceuticals (WHO, 2015, in Cordero et al., 2023). The assertion by Eusebio and Umali (2004 in Cordero et al., 2023) that medicinal plants predate Spanish colonization highlights the indigenous knowledge systems that have existed for centuries in the Philippines. The continued use of medicinal plants in Dagbasan, rooted in historical tradition and passed down through generations, aligns with the global recognition of traditional medicine's value (WHO, 2015 in Cordero et al., 2023). This finding underscores the importance of understanding, documenting, and potentially integrating traditional medicine practices within the larger healthcare framework, while also exploring the scientific validity and sustainable use of these natural resources.

3.4 Participants' Perspective About The Utan and Tambal

The research was conducted through door-to-door visits in the barangay. The participants were friendly and enthusiastic in sharing their experiences regarding food and medicinal plants. All participants reported having experienced struggles in life, with *utan* (vegetables) and *tambal* (medicinal plants) essential for daily survival. Every participant grew food and medicinal plants around their homes, although this was still insufficient in many cases, necessitating market purchases. Most participants claimed that their knowledge of food and medicinal plants was passed down through previous generations, although 10% reported gaining this knowledge from the internet. Balick and Cox (1996) emphasize the importance of ethnobotany in understanding how local communities use plants for sustenance and healthcare. Their work shows that plants are not only food

sources but also integral to self-care, especially in areas where modern medicine is inaccessible. In this study, participants' reliance on *utan* and *tambal* as basic survival tools aligns with these findings, where local plant knowledge is central to daily life.

A key finding in this research was the pattern of knowledge transfer. In-depth interviews revealed that 80% of participants taught their children about edible and medicinal plants. The reasons for transferring this knowledge were insightful. Participants explained that, due to financial constraints, medicines and vegetables were often out of reach. "*Yes, we are poor, so we cannot buy medicine. We cannot afford it most of the time*" [F-AA.04_C2]. The barangay's remote location also makes access to pharmacies and markets difficult. Warren (1992) highlights that intergenerational knowledge transfer is crucial for the survival of indigenous practices, particularly in ethnobotany, where knowledge of local plants is essential for food security and healthcare. Green et al. (2007) further describe how indigenous knowledge systems provide resilience against the socio-economic challenges of globalization and modern healthcare. In this community, reliance on local resources for health and nutrition ensures resilience, preventing further marginalization due to limited access to external markets or services.

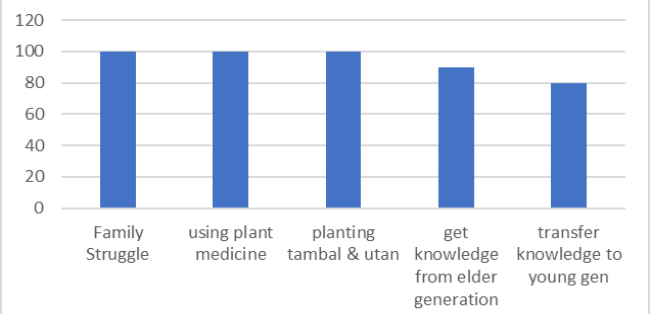

Figure 2. *People in Dagbasan's Perspective About Tambal and Utan*

3.5 Transfer Knowledge

Knowledge and science transfer are ubiquitous processes that can be identified in almost all temporal and spatial contexts (Lippart & Ludwig, 2011). In Dagbasan, people pass down their knowledge to the next generation in various ways. According to the data gathered, 36% of participants reported teaching their children through verbal communication or direct practice by taking them to the garden and demonstrating how to plant, nurture, and understand the functions of the plants. The remaining participants used storytelling and songs, with only a few writing notes about the knowledge. In the case of Dagbasan, 36% of participants reported teaching their children through direct practice by involving them in gardening and plant care, which aligns with Kolb's (1984) concept of "learning by doing." Kolb emphasizes that experiential learning, or learning through direct engagement with tasks and environments, is one of the most effective ways to transfer knowledge. This hands-on approach is critical in communities where practical agriculture and plant use skills are vital for survival.

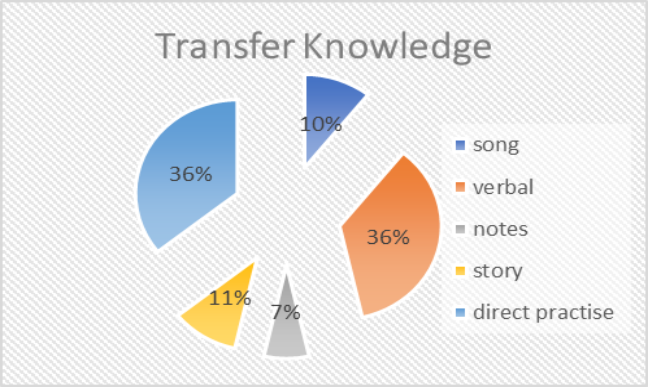

Figure 3. *Transfer Knowledge*

3.6 Science Alternative Learning

Science is a subject that introduces students to how the world works. By making this knowledge accessible to Filipino students, learning becomes more contextual, rooted in their cultural heritage, and therefore more authentic and meaningful. The wisdom and knowledge passed down verbally through generations in the barangay can illuminate science lessons in the classroom. This finding strongly supports a contextualized approach to science education in the Philippines, integrating local communities' rich "wisdom knowledge". Such an approach has the potential to make science learning more relevant, engaging, and authentic for Filipino students, fostering greater scientific literacy and a deeper appreciation for both local heritage and scientific principles. It highlights the opportunity to enrich classroom science lessons with practical, time-tested knowledge passed down through generations. By incorporating students' cultural backgrounds, experiences, and knowledge, this approach aims to make education more meaningful, effective, and empowering (Gay, 2010).

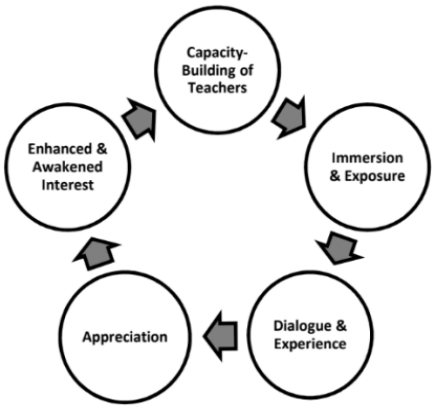

Figure 4. *Transfer Knowledge Process (Gay, 2010)*

This study has illuminated the profound role of mothers in Barangay Dagbasan in preserving and transmitting ethnobotanical knowledge to the next generation. Using ethnography and phenomenology revealed that these mothers serve not only as caregivers but also as informal educators and cultural bearers.

4.0 Conclusion

Mothers in this area have faced significant challenges in their lives. A nanay not only takes care of most of the family's needs but also works to support them. We observed the struggles of Filipino women living below the poverty line, particularly in rural provinces in the Philippines. Many women here live without their spouses for various reasons. Filipinos hold the philosophy of "*laging handa*" (always prepared), which encourages resilience and readiness for any situation. Women, in particular, embody the strength of "*laging handa.*" The research underscores the interconnectedness of cultural heritage, science education, and local wisdom, particularly in how medicinal plants and dietary practices are woven into daily life and child-rearing.

Interpretative Phenomenological Analysis and thematic analysis revealed two core themes: the life histories of the nanay (mother) and the practices surrounding the transfer of knowledge about medicinal and edible plants. These findings demonstrate that scientific learning not only occurs in formal settings but is deeply embedded in lived experience, family traditions, and everyday interactions. Regarding science knowledge transfer, 36% of participants taught their children through direct practice by bringing them to the garden and showing them how to plant, nurture, and understand the function of the plants. The remaining participants passed down knowledge through storytelling and songs, with only a few making written notes.

5.0 Contributions of Authors

The authors specify equal involvement in each section. The authors go through and approve the final work.

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7.0 Conflict of Interests

There is no conflict of interest in the publication of this paper, as declared by the authors.

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