



Ethnobotany in contemporary science education: Meanings, experiences, and relevance among college learners in the Philippines

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Research

Abstract

Background: This study explored the meanings, experiences, and perceived relevance of ethnobotany in contemporary science education among college learners in the Philippines while documenting their ethnobotanical knowledge as supporting evidence. It sought to understand how learners experience ethnobotany, the meanings they assign to it, and its perceived role in science learning.

Methods: A descriptive phenomenological design complemented by ethnobotanical documentation was employed. Twenty-four college learners from a state university in the Philippines participated in semi-structured interviews and completed an ethnobotanical documentation sheet. Interview data were analyzed using Colaizzi's phenomenological method, while ethnobotanical data were analyzed through frequency of citation (FC) and relative frequency of citation (RFC) to identify commonly recognized plant species and their uses.

Results: Participants documented 38 plant species belonging to 24 botanical families, with *Vitex negundo* L. (Lagundi), *Blumea balsamifera* (L.) DC. (Sambong) and *Psidium guajava* L. (Bayabas) emerging as the most frequently cited species (RFC =1). Family members and elders were identified as the primary sources of ethnobotanical knowledge. Thematic analysis revealed that ethnobotany is experienced as everyday knowledge, learned through family and community interactions, and strengthened through lived experiences. Participants perceived ethnobotany as a bridge between culture and science, a tool for understanding scientific concepts, and a means of preserving indigenous and local knowledge. They also emphasized its value in promoting contextualized learning, environmental awareness, and cultural identity.

Conclusions: Ethnobotany remains relevant in contemporary science education by connecting learners' cultural experiences with scientific understanding and supporting contextualized, culturally responsive learning. However, its integration into formal science instruction may be constrained by curriculum demands and limited teacher preparation for incorporating indigenous and local knowledge. Addressing these challenges through curriculum support, localized learning resources, and professional development can help promote meaningful integration while preserving valuable local knowledge systems.

Keywords: Ethnobotany, Science Education, Indigenous Knowledge, Culturally Responsive Teaching, Ethnoscience

Background

Ethnobotany, broadly understood as the study of relationships between people and plants, provides an important lens for examining how societies use, manage, and assign meaning to plant resources (Pieroni *et al.* 2005; Martins *et al.* 2022). Beyond cataloging plant uses, ethnobotany encompasses cultural practices, belief systems, and processes of knowledge transmission that shape human-environment interactions (Martin 1995; Pieroni *et al.* 2005). Across many societies, ethnobotanical knowledge contributes to traditional medicine, food systems, and biodiversity conservation (Amirreza & Kolahi 2023; Marsandi *et al.* 2025). However, rapid modernization, urbanization, and the dominance of Western scientific paradigms have increasingly threatened indigenous and local plant knowledge systems, creating an urgent need to preserve and reexamine their place in contemporary contexts, including formal education (Reyes-García *et al.* 2013; Aswani *et al.* 2018; Flores-Silva *et al.* 2024).

The Philippines offers a particularly important context for ethnobotanical inquiry because of its rich biodiversity and cultural diversity (Dapar *et al.* 2020; Tanalgo *et al.* 2024). Across the archipelago, communities continue to rely on medicinal plants, food crops, and culturally significant flora whose uses are commonly transmitted through oral tradition, family practices, and lived experience (Haselmair *et al.* 2014; Tanalgo *et al.* 2024). Plants such as lagundi (*Vitex negundo*), sambong (*Blumea balsamifera*), and guava (*Psidium guajava*) illustrate how ethnobotanical knowledge remains embedded in everyday health and household practices while also carrying cultural and ecological significance (Dapar *et al.* 2020; Plang *et al.* 2024). Yet this knowledge is increasingly vulnerable as younger generations become more immersed in modern lifestyles and formal schooling that may privilege standardized scientific knowledge over local ecological practices (Aswani *et al.* 2018; Flores-Silva *et al.* 2024).

This concern is especially relevant in science education. Contemporary science teaching is often anchored in standardized curricula that emphasize universal scientific concepts, frequently framed within Western epistemological traditions (Snively & Corsiglia 2000; Zidny *et al.* 2020). While such curricula are essential for scientific literacy, they may unintentionally marginalize locally relevant knowledge systems and limit opportunities for contextualized learning (Flores-Silva *et al.* 2024; Zidny *et al.* 2020). In the Philippines, this issue persists despite policy initiatives such as the National Indigenous Peoples Education (IPEd) Policy Framework, which promotes the recognition and integration of indigenous knowledge systems into education (Miole 2024). From a culturally responsive perspective, integrating learners' cultural backgrounds and lived experiences into instruction can make science more relevant, inclusive, and meaningful while also supporting conceptual understanding and scientific literacy (Pejaner & Mistades 2020; Wallace & Howes 2024; Bolaños *et al.* 2026).

Within this context, ethnobotany offers a promising bridge between local knowledge and formal science learning. By connecting biological and ecological concepts to familiar plants, medicinal practices, and cultural experiences, ethnobotany can help learners relate abstract scientific ideas to real-life contexts (Flores-Silva *et al.* 2024; Gutiérrez-García *et al.* 2024; Koirala, 2022). Such integration may deepen conceptual understanding while also fostering environmental awareness, cultural identity, and appreciation for indigenous and local knowledge systems (Bolaños *et al.* 2026; Marsandi *et al.* 2025). In this sense, ethnobotany is not merely an additional topic within science education but a culturally grounded lens through which science can become more contextualized and socially meaningful.

Despite this potential, existing ethnobotanical research has focused largely on documenting plant species, uses, and cultural significance through inventories and quantitative indices such as use value and relative frequency of citation (Amirreza & Kolahi 2023; Marsandi *et al.* 2025). Comparatively less attention has been given to how ethnobotanical knowledge is experienced, interpreted, and valued by learners within formal educational contexts, and how these meanings intersect with the plant knowledge they actually possess and use (Flores-Silva *et al.* 2024). This gap is important because the relevance of ethnobotany in education cannot be understood solely through plant inventories; it also depends on how learners encounter plant knowledge in their homes, communities, and classrooms, and how they make sense of it in relation to science learning. In the Philippine context, research that brings together learners' ethnobotanical knowledge and their educational experiences remains limited, particularly at the college level, despite policy calls for contextualized and culturally responsive instruction (Pejaner & Mistades 2020; Miole 2024).

Addressing this gap, the present study combines descriptive phenomenology with ethnobotanical documentation to explore the meanings, experiences, and perceived relevance of ethnobotany among college learners in the Philippines while also documenting the plants they recognize, use, and learn about (Martins *et al.* 2022). Rather than treating ethnobotanical documentation as a separate quantitative strand, the study uses it as a complementary source of evidence that contextualizes participants' narratives by documenting the plant species, uses, preparation practices, and sources of knowledge associated with their lived experiences. In this way, the study contributes not by identifying novel plant uses, but

by examining how ethnobotanical knowledge persists among college learners, how it is transmitted and interpreted across everyday and educational contexts, and how it is perceived as relevant to contemporary science education. Specifically, the study sought to explore: (1) how college learners experience ethnobotany, (2) the meanings they assign to it, (3) how they perceive its role in contemporary science education, and (4) the ethnobotanical knowledge they possess in terms of plant use, preparation, and cultural significance. By integrating lived experiences with documented plant knowledge, the study offers a more holistic account of ethnobotany's educational relevance and its potential contribution to culturally responsive science education in the Philippine setting.

Materials and Methods

Research Design

This study employed a qualitative research design using descriptive phenomenology to explore the meanings, experiences, and perceived relevance of ethnobotany in contemporary science education among college learners in the Philippines. Descriptive phenomenology is appropriate when the goal is to understand how individuals experience a phenomenon and the meanings they assign to those experiences. In this study, the phenomenon of interest was learners' encounters with ethnobotany as part of their everyday lives, cultural experiences, and science learning.

To enrich the phenomenological inquiry, the study incorporated an ethnobotanical documentation component that generated descriptive data on participants' knowledge of plant species, reported uses, preparation methods, and sources of knowledge. Rather than functioning as an independent quantitative strand, this component served a complementary and corroborative role by situating participants' narratives within concrete plant-related practices and documented ethnobotanical knowledge. In this way, the ethnobotanical data helped contextualize and support the meanings that emerged from the interviews, providing a more comprehensive account of how learners experience, interpret, and apply ethnobotanical knowledge in relation to science learning.

Because ethnobotanical knowledge is often culturally situated and transmitted through families and communities, the study was guided by ethical principles of respect for culturally derived knowledge, voluntary participation, informed consent, confidentiality, and sensitivity to the ownership and sharing of traditional knowledge. Participants were invited to share only the plant-related knowledge and experiences they were personally comfortable disclosing.

Study Area

The study was conducted in a state university in the Philippines offering undergraduate programs in teacher education, science, and related disciplines. The institution was selected because it provides learning environments in which students are exposed to science-related concepts such as plants, biodiversity, ecology, environmental relationships, and, in some cases, traditional or community-based knowledge. It therefore offered an appropriate context for exploring how college learners encounter, interpret, and value ethnobotanical knowledge in relation to formal science learning.

Although the university offers programs more directly connected to biology and environmental science, the study also included students from other academic programs who had prior exposure to plant-related, environmental, or traditional knowledge topics through general education, science-related, or interdisciplinary coursework. This allowed the inquiry to capture a broader range of learner experiences and meanings associated with ethnobotany across diverse disciplinary backgrounds.

Participants and Sampling

Participants were selected through purposive sampling based on the following inclusion criteria: (1) currently enrolled as a college student in the university; (2) had taken or were currently taking biology, environmental science, or related science courses, or had prior exposure to plant-related, biodiversity, or traditional knowledge topics in formal instruction; (3) were familiar with at least some medicinal, food, or culturally significant plants used in their home or community; and (4) were willing to participate in an interview and complete the ethnobotanical documentation sheet.

A total of 24 college learners participated in the study. Recruitment continued until sufficient depth and redundancy in meanings, experiences, and descriptions of ethnobotany were observed across participant narratives. Interested students were screened based on the inclusion criteria before being invited to participate. The sample represented different academic programs, year levels, genders, and levels of exposure to ethnobotanical practices, allowing for variation in perspectives while maintaining the depth required for phenomenological inquiry.

Although the final sample was composed largely of students from BS Philosophy and BSEd Physics, these participants were retained because they satisfied the inclusion criteria and had prior exposure to plant-related, environmental, or traditional knowledge topics relevant to the study. Their inclusion was consistent with the study's purpose of exploring the lived meanings and perceived relevance of ethnobotany among college learners with varied academic backgrounds, rather than limiting the inquiry to students enrolled exclusively in biology or environmental science programs. Nevertheless, the disciplinary composition of the sample is acknowledged as a contextual limitation, as learners from Philosophy and Physics may engage with ethnobotanical knowledge differently from those in plant- or environment-focused disciplines.



Figure 1. Map of Mindanao State University in Iligan, Lanao del Norte, Philippines, showing the study area

Research Instruments

Semi-Structured Interview Guide

The primary data source for the phenomenological component was a researcher-developed semi-structured interview guide. The guide contained open-ended questions designed to elicit participants' experiences with plants and plant-related knowledge, their encounters with ethnobotany in formal and informal contexts, their perceptions of its relevance to science learning, and the meanings they assigned to traditional plant knowledge within their lives and educational experiences. Follow-up and probing questions were used to encourage elaboration, clarification, and richer descriptions of participants' lived experiences.

To establish content validity, the interview guide was reviewed by three experts with backgrounds in science education, qualitative research, and ethnoscience or indigenous knowledge integration in education. The experts examined the guide for clarity, relevance, cultural appropriateness, and alignment with the study objectives and phenomenological focus. Based on their feedback, revisions were made to improve the wording, sequencing, and appropriateness of the interview prompts for the target participants.

The finalized guide was designed to generate rich first-person accounts of how learners encountered, understood, and valued ethnobotany in both educational and everyday contexts. These narratives served as the primary basis for the phenomenological analysis.

Ethnobotanical Documentation Sheet

To complement the interview data, participants completed an ethnobotanical documentation sheet after the interview. The instrument was designed to gather descriptive information about the plant species known to participants, including vernacular or local names, scientific names (if known), common English names, reported uses, plant parts utilized, preparation methods, source(s) of knowledge, and frequency of use.

The documentation sheet enabled the researchers to identify the plant species commonly recognized and used by participants and to generate descriptive ethnobotanical evidence that could contextualize and corroborate the interview narratives. Participants were first encouraged to report plant names in the form most familiar to them, particularly vernacular or commonly used names. Where scientific names were unknown to participants, the researchers subsequently verified plant identities through available ethnobotanical literature, botanical references, and online plant databases. When

necessary, species names were cross-checked against commonly reported Philippine ethnobotanical plant names to improve consistency and reduce ambiguity in classification.

To summarize the salience of each species across participants, *Frequency of Citation* (FC) and *Relative Frequency of Citation* (RFC) were computed. FC refers to the number of participants who cited a particular plant species, while RFC was computed using the formula:

$$RFC = \frac{FC}{N}$$

where FC is the number of participants who cited the plant species and N is the total number of participants in the study.

Data Collection Procedures

Data collection was conducted in two phases.

Phase 1: Semi-Structured Interviews

In the first phase, semi-structured interviews were conducted to gather participants' lived experiences and perceptions regarding ethnobotany and its relevance to science learning. Prior to the interview, participants were informed about the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw at any point without penalty. Written informed consent was secured before data collection began.

Interviews were conducted using English, Filipino, or a combination of both languages, depending on the participant's preference, to support comfort and authentic expression. Each interview lasted approximately 30 to 60 minutes and was audio-recorded with participants' consent. Field notes were also taken to document contextual observations, nonverbal cues when relevant, and emerging reflections during the interview process. The recordings were later transcribed verbatim for analysis. For interviews that involved Filipino or mixed Filipino-English responses, transcripts were reviewed carefully to preserve participants' intended meanings during transcription and analysis.

Phase 2: Ethnobotanical Documentation

Immediately after the interview or within the same data collection session, participants were asked to complete the ethnobotanical documentation sheet. They were invited to list plant species with which they were familiar and to describe the plants' reported uses, plant parts utilized, methods of preparation, source(s) of knowledge, and frequency of use. Where necessary, the researcher provided clarification on how to complete the sheet without influencing participants' responses.

This second phase allowed the study to document participants' actual ethnobotanical knowledge alongside their phenomenological accounts. Examples of plants commonly cited by participants included lagundi (*Vitex negundo*), bayabas (*Psidium guajava*), sambong (*Blumea balsamifera*), malunggay (*Moringa oleifera*), and luya (*Zingiber officinale*), among others.

Data Analysis

Phenomenological Analysis

Interview transcripts were analyzed using Colaizzi's descriptive phenomenological method, which is well suited for identifying the essential structure of lived experience. The analysis followed seven steps:

1. Familiarization with the data - All interview transcripts were read and reread several times to gain an overall sense of participants' experiences and meanings related to ethnobotany.
2. Extraction of significant statements - Statements directly relevant to the experience, meaning, and perceived relevance of ethnobotany were identified and extracted from the transcripts.
3. Formulation of meanings - Meanings were formulated from the significant statements while remaining grounded in participants' accounts.
4. Clustering of themes - Related meanings were grouped into clusters, and these clusters were examined for patterns, convergence, and conceptual relationships.
5. Development of an exhaustive description - The clustered meanings and themes were integrated into a rich, comprehensive description of how learners experienced and understood ethnobotany.
6. Formulation of the fundamental structure - The exhaustive description was refined into a concise statement of the essential structure of the phenomenon.
7. Validation through member checking - A subset of participants was invited to review the interpretations or summary of findings to determine whether these resonated with their experiences.

To support phenomenological reduction, the researchers engaged in reflexive memoing and bracketing throughout data collection and analysis. Prior assumptions, expectations, and prior knowledge regarding ethnobotany, science education, and indigenous knowledge integration were documented in reflexive notes so that the analysis could remain as close as possible to participants' lived meanings rather than the researchers' preconceptions.

Ethnobotanical Analysis

Data from the ethnobotanical documentation sheets were analyzed using descriptive ethnobotanical techniques. Plant species were organized and summarized according to botanical family, scientific name, vernacular name, common English name, reported uses, plant parts utilized, preparation methods, source(s) of knowledge, and frequency of use. FC and RFC were calculated to identify the most frequently recognized and reported plant species among participants.

Participants were allowed to report multiple sources of ethnobotanical knowledge for each plant. To improve consistency in the dataset, these responses were grouped into broader categories during analysis. Specifically, family/elders included parents, grandparents, relatives, and household elders; community included neighbors, community members, and traditional healers; school included teachers, classroom lessons, and school-based activities; health/media sources included health centers, Department of Health information, television health programs, advertisements, and social media or internet content; and cultural/ancestral sources referred to ancestral traditions, tribal or Moro elders, and culturally transmitted practices. When participants reported multiple sources for a single plant, all relevant categories were retained.

The ethnobotanical findings were not treated as a separate strand of inquiry but were integrated with the phenomenological results in a complementary and corroborative manner. Specifically, the documentation of plant species, uses, preparation practices, and sources of knowledge provided concrete evidence that contextualized the themes emerging from the interviews. For example, claims regarding the persistence of medicinal plant use, the importance of family-based knowledge transmission, and the everyday relevance of ethnobotany could be examined alongside the actual plant knowledge documented by participants. In this way, the ethnobotanical data strengthened the interpretation of the phenomenological findings by linking learners' narratives to tangible plant-related practices.

Qualitative data organization, coding, and theme development were supported through NVivo or equivalent qualitative data management procedures.

Trustworthiness of the Study

The rigor of the study was established using Lincoln and Guba's criteria of trustworthiness, namely credibility, dependability, confirmability, and transferability.

Credibility

Credibility was strengthened through prolonged engagement with the data, repeated reading of transcripts, careful extraction of significant statements, and systematic theme development using Colaizzi's descriptive phenomenological method. Credibility was further enhanced through member checking, in which a subset of participants reviewed summary interpretations of the findings to assess whether these accurately reflected their experiences and meanings. In addition, the integration of interview narratives with ethnobotanical documentation served as a form of methodological triangulation, allowing participants' reported experiences to be examined alongside the plant knowledge they documented.

Dependability

Dependability was supported through the maintenance of an audit trail documenting the major stages of the research process, including participant recruitment, interview procedures, transcription, coding, formulation of meanings, theme clustering, and development of the phenomenological description. This record helped ensure transparency in how interpretations were reached and how the findings were generated.

Confirmability

Confirmability was enhanced through reflexive journaling, analytic memoing, and bracketing. The researchers documented their assumptions, reactions, and interpretive decisions throughout the study in order to minimize undue influence of personal bias on data interpretation. The audit trail also contributed to confirmability by showing how codes, meanings, and themes were grounded in participants' actual statements and documented ethnobotanical responses.

Transferability

Transferability was addressed through thick description of the research setting, participants, context of science learning, and the nature of participants' ethnobotanical experiences. By providing detailed contextual information, the study allows

readers to assess the extent to which the findings may be relevant to other higher education settings, science learning environments, or studies involving ethnobotany and culturally responsive education.

Ethical Considerations

Participants were informed of the purpose of the study, the procedures involved, the voluntary nature of participation, potential risks and benefits, confidentiality measures, and their right to withdraw from the study at any point without penalty. Written informed consent was obtained from all participants prior to the conduct of the interviews and ethnobotanical documentation activities.

To protect anonymity and confidentiality, pseudonyms or participant codes were used in transcripts, notes, and the presentation of qualitative findings. Audio recordings, transcripts, and documentation sheets were stored securely and were accessible only to the researchers for research purposes.

Because the study involved the documentation of plant-related knowledge that may be rooted in family, community, and traditional practices, particular care was taken to ensure the ethical handling of culturally derived knowledge. Participants were invited to share only the plant-related information they were personally comfortable disclosing, and no sacred, proprietary, or community-restricted knowledge was intentionally solicited or documented. Although the study did not directly involve an Indigenous Cultural Community/Indigenous Peoples (ICC/IP) community as a research site or participant group, it was conducted with sensitivity to the ethical principles underlying culturally grounded research in the Philippine context, including respect for cultural knowledge, voluntary participation, informed consent, confidentiality, and recognition of the ownership and appropriate sharing of traditional knowledge. In this regard, while formal Free and Prior Informed Consent (FPIC) procedures under NCIP Administrative Order No. 3, s. 2012 were not required, the study remained guided by the broader principles of cultural respect and ethical responsibility in handling ethnobotanical knowledge.

Results

Table 1. Demographic Characteristics of the Participants

Variable	Category	f	%
Age	19	1	4.2
	20	1	4.2
	21	8	33.3
	22	7	29.2
	23	3	12.5
	24	1	4.2
	25	1	4.2
	26	2	8.3
Gender	Male	8	33.3
	Female	16	66.7
Program/Course	BS Philosophy	13	54.2
	BSEd Physics	9	37.5
	BSEd Chemistry	1	4.2
	BSEd Biology	1	4.2
Year Level	First Year	1	4.2
	Second Year	4	16.7
	Third Year	5	20.8
	Fourth Year	14	58.3
Taken Biology or Environmental Science Courses	Yes	24	100
	No	0	0
Encountered Lessons Related to Plants or Traditional Knowledge	Yes	23	95.8
	No	1	4.2
Familiar with Medicinal Plants	Yes	24	100
	No	0	0

Table 1 presents the demographic characteristics of the participants. Most were between 21 and 22 years old, accounting for 33.3% and 29.2% of the sample, respectively, and the majority were female (66.7%). In terms of academic background, more than half were enrolled in the BS Philosophy program (54.2%), followed by BSEd Physics students (37.5%), with one participant each from BSEd Chemistry and BSEd Biology (4.2% each). Most participants were in their fourth year of study (58.3%). All participants had taken Biology or Environmental Science courses, and nearly all (95.8%) had encountered lessons related to plants or traditional knowledge. In addition, all participants reported familiarity with medicinal plants such as lagundi, sambong, and guava, indicating prior exposure to ethnobotanical knowledge across the sample.

Table 2. Commonly Cited Plant Species and Their Uses Among Participants

Family	Scientific Name	Vernacular Name	Common English Name	Reported Uses	Parts Used	Preparation Methods	Source of Knowledge	Frequency of Use	FC	RFC
Lamiaceae	<i>Vitex negundo</i> L.	Lagundi	Five-leaved chaste tree	Cough, colds, asthma, fever, body aches	Leaves, roots	Decoction, tea, syrup, cooked preparation	School, family, elders, community, DOH/health education	Sometimes, often, as needed, rarely	24	1
Myrtaceae	<i>Psidium guajava</i> L.	Bayabas, Guava	Guava	Wound cleaning, diarrhea, gargle, stomach pain, gum disease, food	Leaves, fruits	Decoction, wound wash, gargle, eaten fresh, applied directly	Family, community, school, internet	Often, sometimes, rarely, as needed	24	1
Asteraceae	<i>Blumea balsamifera</i> (L.) DC.	Sambong, Gabon	Ngai camphor	Diuretic, kidney stones, UTI, cough, colds, wound healing	Leaves	Decoction, herbal tea, warm leaves applied to body pain	Elders, family, community, school, health center, TV health programs	Sometimes, often, rarely, as needed	24	1
Euphorbiaceae	<i>Euphorbia hirta</i> L.	Tawa-tawa, Gatas-gatas	Asthma weed	Fever, dengue support, skin sores, sickness	Leaves, roots, whole plant, sap	Infusion, decoction, juice/sap applied directly, boiled as tea	Community, family, neighbors, elders	Often, sometimes	22	0.917
Moringaceae	<i>Moringa oleifera</i> Lam.	Malunggay, Kamunggay	Drumstick tree	Food, wound healing, immunity, cuts, swelling	Leaves, roots, seeds, flowers	Cooked in soups/viands, tea, decoction, crushed and applied to wounds	Family, community, school nutrition lessons	Often, sometimes, daily/as needed	22	0.917
Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Luya	Ginger	Colds, sore throat, nausea, joint pain, food, cultural healing	Rhizome	Tea/salabat, decoction, cooking ingredient, healing rubs	Family, grandparents, community, home remedies	Often, always, rarely, as needed	21	0.875
Amaryllidaceae	<i>Allium sativum</i> L.	Bawang	Garlic	Food, blood pressure/cholesterol, infection, cough	Bulb	Eaten raw, cooked, poultice, infusion	Family, parents, grandparents, media	Often, always, daily/as needed	21	0.875
Arecaceae	<i>Cocos nucifera</i> L.	Niyog, Lubi	Coconut	Food, medicine, cultural uses, spices	Fruit, water, oil, husk, shell	Consumed fresh, oil applied, coconut milk, charred/pounded spices	Family, community, ancestral/cultural traditions	Daily, often, sometimes, always	20	0.833

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Caricaceae	<i>Carica papaya</i> L.	Papaya	Papaya	Food, digestion, fever support, appetite improvement	Fruit, leaves	Eaten fresh, cooked, decoction, leaf extract	Family, community, school science lessons	Sometimes, weekly/as needed	19	0.792
Cucurbitaceae	<i>Momordica charantia</i> L.	Ampalaya	Bitter gourd	Food, blood sugar management	Leaves, fruits, whole plant	Cooked vegetable, decoction, juiced raw	Family, community, school	Often, weekly, daily if medicinal	17	0.708
Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Tanglad	Lemongrass	Food flavoring, stomachache relief, insect repellent	Leaves, stems, stalks	Tea, infusion, cooked in dishes, brewed in soups	Family, grandparents, school, cooking experiences	Often, 2-3 times/week	16	0.667
Lamiaceae	<i>Origanum vulgare</i> L.	Oregano, Kalabo	Oregano	Cough, asthma, food flavoring, oil	Leaves	Juice extraction, heated leaves squeezed, taken orally	Family, elders, community	Often, sometimes	13	0.542
Musaceae	<i>Musa paradisiaca</i> L.	Saging, Banana	Banana	Food, cultural and medicinal use	Fruit, leaves, flower, trunk	Eaten raw/cooked, flower boiled, leaves used for cooking	Family, community, culture	Daily, often	13	0.542
Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Nees	Ampion	King of bitters	Stomachache, dysmenorrhea, medicinal use	Leaves	Decoction	Traditional healers	Sometimes	9	0.375
Amaryllidaceae	<i>Allium tuberosum</i> Rottler ex Spreng.	Ganda	Garlic chives	Food, cultural, medicinal/labor pain relief	Leaves, bulbs	Squeezed or washed with lukewarm water and rubbed on belly	Ancestral/Moro community elders	Often	9	0.375
Annonaceae	<i>Annona muricata</i> L.	Guyabano	Soursop	Food, medicinal use	Fruit, leaves	Fruit eaten fresh, leaves boiled as tea	Neighbors, relatives	Sometimes	8	0.333
Araceae	<i>Colocasia esculenta</i> (L.) Schott	Gabi	Taro	Food, cultural use	Corm, leaves	Cooked thoroughly, soups, laing	Parents, community	Weekly	8	0.333
Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f.	Sabila, Aloe vera	Aloe vera	Burns, hair/cosmetic use	Leaves	Gel applied to burns and hair	Parents, advertisements	Sometimes	8	0.333
Asteraceae	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Hagunoy	Siam weed	Toothache	Leaves	Crushed leaves applied to aching tooth/gums	Family, community	Sometimes	7	0.292

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Athyriaceae	<i>Diplazium esculentum</i> (Retz.) Sw.	Pako	Vegetable fern	Food, cultural use	Young fronds	Eaten raw, blanched, sautéed	Community, market	Sometimes	5	0.208
Clusiaceae	<i>Garcinia mangostana</i> L.	Mangosteen	Mangosteen	Medicinal use	Fruit, peel	Discussed as herbal medicine	School, community	Rarely	5	0.208
Convolvulaceae	<i>Ipomoea batatas</i> (L.) Lam.	Kamote	Sweet potato	Food, medicinal use	Roots, leaves	Cooked roots/leaves, decoction	Parents, community	2-3 times/week	5	0.208
Fabaceae	<i>Senna alata</i> (L.) Roxb.	Bayabas-bayananan	Candle bush	Skin infection	Leaves	Applied directly to infected skin	School	Sometimes	5	0.208
Lamiaceae	<i>Clinopodium douglasii</i> (Benth.) Kuntze	Yerba buena	Yerba buena	Headache, body pain, stomachache, insect bites, colds	Leaves, stems	Tea, poultice	Parents, grandparents, community	As needed	5	0.208
Lamiaceae	<i>Coleus amboinicus</i> Lour.	Kapal, Oregano hapon	Indian borage	Cough	Leaves	Leaves squeezed; juice taken orally	Family, traditional medicine, school	As needed	4	0.167
Lamiaceae	<i>Coleus scutellarioides</i> (L.) Benth.	Asunting	Painted nettle	Fungal skin infection	Leaves	Crushed leaves applied directly	Family, community	Sometimes	4	0.167
Lamiaceae	<i>Ocimum basilicum</i> L.	Balanoi, Basil	Basil	Food, herbal remedy	Leaves	Used in cooking and as herbal remedy	Family, school gardening	Rarely	3	0.125
Lamiaceae	<i>Plectranthus amboinicus</i> (Lour.) Spreng.	Kalabo, Oregano	Indian borage/Cuban oregano	Cough, colds	Leaves	Crushed for juice or boiled as tea	Parents, grandparents, community remedies	Often	3	0.125
Malvaceae	<i>Abelmoschus manihot</i> (L.) Medik.	Lagikway, Gikway	Aibika	Food	Leaves	Boiled, steamed, cooked in coconut milk	Family, community, ancestral knowledge	Often	3	0.125
Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Gumamela	Hibiscus	Cough, bronchitis, skin irritation, natural shampoo	Flowers, leaves	Decoction, skin/hair wash	Parents, elders, school lessons	As needed	3	0.125
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb.	Pandan	Pandan	Food, cultural use	Leaves	Added to rice and desserts for aroma	Cooking traditions	Often	3	0.125
Piperaceae	<i>Peperomia pellucida</i> (L.) Kunth	Sinaw-sinaw, Pansit-pansitan	Shiny bush	UTI, stomachache	Leaves, stems	Washed and boiled; decoction drunk	Family, community	Often	2	0.083

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Poaceae	<i>Bambusa blumeana</i> Schult.f.	Kawayan	Spiny bamboo	Cultural use, construction, medicinal use	Stems, leaves, shoots	Construction use, decoction, sap application	Elders, community, cultural teachings	Daily/as needed	2	0.083
Poaceae	<i>Coix lacryma-jobi</i> L.	Aglay	Job's tears	Food, cultural use	Seeds	Fermented into traditional rice wine; boiled as rice substitute	Ancestral/tribe elders	Rarely	1	0.042
Poaceae	<i>Oryza sativa</i> L.	Palay, Bigas	Rice	Food, cultural use	Grain	Cooked as rice	Daily household experience	Daily	1	0.042
Rutaceae	<i>Citrus × microcarpa</i> Bunge	Calamansi	Calamansi	Food, cough, flu	Fruit	Juice mixed with warm water	Family	Often	1	0.042
Urticaceae	<i>Dendrocnide meyeniana</i> (Walp.) Chew	Alingatong	Stinging tree	Arthritis, muscle pain	Leaves, roots	Infused with coconut oil and applied topically	Traditional healers	Sometimes	1	0.042
Zingiberaceae	<i>Curcuma longa</i> L.	Luyang dilaw, Turmeric	Turmeric	Food, medicinal use	Rhizome	Boiled as tea or used as spice	Elders, social media health content	Sometimes	1	0.042

Table 2 presents the ethnobotanical knowledge documented among the participants, comprising 38 plant species belonging to 24 botanical families. The most frequently cited species were *Vitex negundo* L. (lagundi), *Psidium guajava* L. (bayabas), and *Blumea balsamifera* (L.) DC. (sambong), each with a frequency of citation (FC) of 24 and a relative frequency of citation (RFC) of 1.000, indicating that all participants reported familiarity with these species. These were followed by *Euphorbia hirta* L. (tawa-tawa) and *Moringa oleifera* Lam. (malunggay), each with an FC of 22 and an RFC of 0.917. Other highly cited species included *Zingiber officinale* Roscoe (luya) and *Allium sativum* L. (bawang), each with an FC of 21 and an RFC of 0.875, as well as *Cocos nucifera* L. (niyog), *Carica papaya* L. (papaya), *Momordica charantia* L. (ampalaya), and *Cymbopogon citratus* (DC.) Stapf (tanglad). Reported uses were predominantly medicinal, particularly for common ailments such as cough, fever, wounds, digestive discomfort, and inflammation, although several plants were also identified for food, cultural, and household purposes. Overall, the data indicate that participants possessed familiarity with a range of commonly used medicinal and food plants that form part of everyday household and community practices.

Table 3. Sources of Ethnobotanical Knowledge Among Participants

Source of Knowledge	f	% of Participants
Family / Elders	22	91.7
School	16	66.7
Community	16	66.7
Social Media / Internet	16	66.7

Note. Multiple responses were allowed; therefore, frequencies and percentages do not total 100%.

Table 3 presents the sources from which participants acquired ethnobotanical knowledge. Family and elders were the most frequently reported source (f = 22, 91.7%), underscoring the importance of intergenerational transmission in the preservation of plant-related knowledge and practices. School, community, and social media/internet were each identified by 16 participants (66.7%), indicating that participants encountered ethnobotanical knowledge across home, community, formal learning, and digital environments. Overall, the findings suggest that ethnobotanical knowledge among participants is shaped primarily through family-based learning, while schools, communities, and online platforms function as additional spaces of exposure and reinforcement.

Themes on the Meanings, Experiences, and Relevance of Ethnobotany

Analysis of participants' narratives using Colaizzi's phenomenological method yielded five interrelated themes describing how college learners experience ethnobotany, the meanings they assign to it, and how they perceive its relevance in contemporary science education. Across the interviews, ethnobotany was not understood simply as knowledge about plants. Rather, it emerged as a lived, transmitted, and negotiated form of knowledge situated at the intersection of family practice, cultural memory, local ecology, and formal science learning. The themes below are presented as interrelated dimensions of this experience rather than as isolated categories.

Theme 1. Ethnobotany as Everyday, Lived, and Transmitted Knowledge

Participants described ethnobotany as knowledge embedded in ordinary life rather than as information encountered only in formal schooling. Their narratives showed that plant knowledge was learned and used in relation to illness, food preparation, caregiving, household routines, and interactions with the surrounding environment. In this sense, ethnobotany was experienced as a practical and lived form of knowing that guided everyday decisions and actions.

One participant explained:

"I've used local plants like guava leaves to clean small wounds, lemongrass to make herbal tea, and malunggay as part of meals because of its nutritional benefits."

This account illustrates how ethnobotanical knowledge functioned as ordinary household knowledge rather than specialized expertise.

Similarly, another participant shared:

"Quite often, as my nephews and nieces often get fevers, tawa-tawa is very much common in our kitchen."

Such narratives suggest that medicinal plants were not occasional alternatives but familiar resources integrated into routine family caregiving. Participants also associated plants with environmental comfort and well-being. One learner explained:

"The acacia tree at the back of our house helps make our house less hot during summer because of the shade it gives."

Together, these accounts show that participants' plant knowledge extended beyond medicinal and nutritional uses to include ecological and quality-of-life functions.

Participants further emphasized that ethnobotanical knowledge was learned relationally, especially through family members and community elders. Many described grandparents, parents, and older relatives as their first teachers in plant use and care:

"I first learned about these plant practices directly from my parents, grandparents, and other close relatives."

"I learned it first from my grandmother."

For many participants, this learning occurred through repeated observation and participation rather than through formal instruction.

One participant recalled:

"My mother would crush guava leaves and put them on my wounds whenever I got injured while playing."

This account shows how ethnobotanical knowledge became embedded in memory through caregiving and repeated family practice.

Another participant noted:

"Throughout my growth, elders and parents taught me about the uses of plants."

These narratives reinforce the pattern shown in Table 3, where family and elders emerged as the dominant sources of ethnobotanical knowledge. Ethnobotany, therefore, was experienced not only as practical knowledge but also as cultural inheritance—a body of understanding transmitted across generations through care, trust, and everyday interaction.

Participants also emphasized the importance of direct experience in making ethnobotanical knowledge meaningful. They described learning through gardening, plant care, observation, and hands-on engagement with plants.

One participant shared:

"We had a professor who made us take care of plants in a designated place."

Another elaborated:

"When our professor made us plant Italian oregano, take care of it, label it, and discuss it, I understood plant concepts better."

Participants explained that these experiences allowed them to connect scientific ideas to observable phenomena.

One learner reflected:

"Watching sunflowers turn their heads toward the sun helped me understand plant responses."

Another stated:

"Understanding turgor pressure became easier because I could observe how plants stay firm and healthy."

These accounts indicate that ethnobotany was not experienced only as inherited cultural knowledge, but also as knowledge deepened through lived and sensory encounters with plants. As a result, participants came to understand ethnobotany as a form of learning through doing, observing, remembering, and applying.

Theme 2. Ethnobotany as a Bridge Between Cultural Knowledge and Scientific Understanding

Participants consistently described ethnobotany as a meeting point between traditional knowledge and science. Rather than viewing local plant knowledge and scientific knowledge as inherently opposed, many saw ethnobotany as a framework through which both could be connected, compared, and mutually understood. In this sense, ethnobotany functioned as an interpretive bridge linking what learners already knew from home and community with what they encountered in formal science classes.

One participant explained:

“Ethnobotany means linking our community’s traditional wisdom with formal science.”

Another stated:

“Traditional knowledge tells me what works, while science explains why it works.”

These accounts show how participants positioned science not necessarily as a replacement for traditional knowledge, but as a means of explaining and validating practices that had long been observed in family and community settings.

A participant further noted:

“It bridges abstract scientific concepts with real-world cultural practices.”

For participants, this bridging function reduced the distance between classroom science and lived experience. Familiar plants and household remedies became points of entry for understanding scientific concepts, while science offered language and mechanisms for making sense of practices already trusted in daily life.

This theme also reveals that ethnobotany was meaningful because it translated abstract science into culturally recognizable contexts.

One participant explained:

“Plant knowledge helped me understand antibacterial properties and healing processes because I already knew how malunggay and guava leaves were used at home.”

Another reflected:

“Ethnobotany makes biology and environmental science easier and more meaningful.”

A third participant described it succinctly as something that:

“turns abstract textbook concepts into real-world applications.”

Together, these narratives show that participants did not assign meaning to ethnobotany simply because it involved plants, but because it enabled them to connect theory with familiar cultural and environmental experiences. Ethnobotany was therefore experienced as an educationally powerful form of mediation between what is lived, what is inherited, and what is scientifically explained.

Theme 3. Ethnobotany as a Means of Contextualized Learning, Environmental Awareness, and Cultural Continuity

Participants perceived ethnobotany as highly relevant to contemporary science education because it made learning more contextualized, meaningful, and socially grounded. They emphasized that science became easier to understand when linked to plants, remedies, and practices that were already part of their everyday realities. Ethnobotany helped them see that science does not exist only in textbooks and laboratories, but also in kitchens, gardens, backyards, farms, and community practices.

One participant explained:

“Ethnobotany connects what I learn in textbooks with the real, living knowledge from my family and community.”

Another shared:

“It helps us understand plants more and know when and where we can use them.”

A third participant remarked:

“It turns abstract lessons into practical knowledge.”

These accounts suggest that ethnobotany supported contextualized learning by allowing students to relate scientific concepts to familiar experiences and real-life applications. Rather than treating science as decontextualized content, participants experienced ethnobotany as a framework that made learning relevant to health, food, caregiving, and everyday decision-making.

At the same time, ethnobotany fostered environmental awareness and biodiversity appreciation. Participants described becoming more attentive to plants, more observant of ecological relationships, and more aware of the role of plants in sustaining life.

One participant shared:

“I am more gentle with plants now and pay more attention to how they grow.”

Another explained:

“It helps me appreciate how plants contribute to maintaining ecological balance.”

Through ethnobotanical learning, participants began to see plants not merely as biological specimens or resources for use, but as integral components of ecological systems and human survival. Ethnobotany thus encouraged a more relational view of the environment—one that linked plant use, care, and ecological responsibility.

Participants also viewed ethnobotany as important for preserving cultural identity and heritage. Learning about traditional plant knowledge was associated with pride, belonging, and continuity with previous generations.

One participant reflected:

“Learning traditional plant knowledge makes me proud of our culture and strengthens my identity.”

Another shared:

“It amazes me how this knowledge has been passed from generation to generation.”

A third participant noted:

“It shows that ancient cultures are brilliant.”

These narratives suggest that ethnobotany carried significance beyond scientific learning alone. It represented a way of safeguarding cultural memory, honoring ancestral knowledge, and affirming the value of local ways of understanding the environment. For participants, then, ethnobotany contributed simultaneously to scientific relevance, environmental consciousness, and cultural continuity.

Theme 4. Ethnobotany as a Site of Tension, Validation, and Epistemic Negotiation

Although participants generally valued ethnobotany, they also described tensions in learning, interpreting, and validating traditional plant knowledge. A recurring challenge involved negotiating between inherited cultural practices and scientific evidence. Participants often respected traditional remedies and plant-based beliefs because these were embedded in family life, yet they also recognized that some claims might not be fully supported by science.

One participant reflected:

“Sometimes it is hard to accept that practices we used to follow are proven wrong by science.”

Another stated:

“Not all knowledge or practices about plants are true. Some are proven wrong by science.”

These statements reveal an important dimension of participants’ experiences: ethnobotany was not simply accepted uncritically as “tradition,” nor was science automatically privileged without question. Instead, participants described a process of epistemic negotiation in which they weighed cultural trust, family experience, and empirical evidence against one another. For some, this created discomfort because questioning plant practices could feel like questioning family wisdom or cultural identity. At the same time, it also encouraged more critical engagement with inherited knowledge.

Despite these tensions, many participants did not view science and traditional knowledge as irreconcilable. Rather, they saw them as potentially complementary.

One learner explained:

“Traditional knowledge and science complement each other because science explains why these practices work.”

This perspective suggests that participants did not necessarily want one knowledge system to replace the other. Instead, they valued ethnobotany as a space where traditional knowledge could be examined, affirmed, revised, or better understood through scientific inquiry. In this sense, ethnobotany became a site not only of cultural preservation but also of critical reflection and knowledge negotiation.

Participants also described frustration with the marginalization of ethnobotanical knowledge in formal education. Although many believed ethnobotany had clear relevance to science learning, they felt it was often treated superficially or peripherally in school.

One participant explained:

“Lessons often only briefly mention these practices without deep discussion or hands-on activities.”

Another shared:

“Traditional plant knowledge is sometimes presented only as a fun fact.”

Participants noted a disconnect between the rich plant knowledge they encountered in home and community settings and the limited way such knowledge appeared in science classrooms. As a result, they sometimes perceived local knowledge as undervalued within formal education. These accounts indicate that the challenge was not simply a lack of content, but a lack of recognition: ethnobotany was experienced as valuable, yet insufficiently legitimized within the curriculum.

Theme 5. Reimagining Science Education Through Ethnobotany

When asked how ethnobotany could be better integrated into science education, participants articulated a vision of science learning that is more local, experiential, community-connected, and culturally responsive. Their recommendations were not limited to adding a few plant examples to existing lessons. Rather, they pointed toward a broader reorientation of science education—one that takes learners’ local realities and community knowledge seriously as foundations for learning.

First, participants recommended grounding science lessons in local plant knowledge and familiar cultural practices. They believed that instruction should begin with plants and examples learners already know from home and community life.

One participant stated:

“Teach using local plants and our own traditional practices before foreign examples.”

Another suggested:

“Include more local plants and traditional remedies as lesson examples.”

These recommendations reflect participants’ desire for science teaching that acknowledges what students already know and uses local plant knowledge as an entry point for learning scientific concepts.

Second, participants emphasized the need for experiential and community-based learning. They repeatedly described meaningful learning as something that happens through doing, observing, growing, preparing, and interacting with plants directly.

One participant proposed:

“Growing plants, preparing remedies, conducting experiments, and going on field trips.”

Another explained:

“Discover plants in the local area and conduct more hands-on activities.”

These suggestions align with earlier themes showing that participants learned most meaningfully when plant knowledge was connected to lived experience. Participants also highlighted the value of community knowledge holders, suggesting that schools could learn from elders and local practitioners whose knowledge is often absent from textbooks.

Finally, participants called for greater curricular recognition of indigenous and community knowledge.

One participant stated:

“Value our elders’ knowledge and invite them to share in class.”

Another recommended:

“Connect traditional uses clearly to scientific explanations.”

These statements indicate that participants did not want ethnobotany to remain a peripheral “add-on” to science education. Instead, they envisioned a curriculum that recognizes local knowledge as a legitimate educational resource, invites dialogue between community wisdom and scientific explanation, and uses ethnobotany to make science more culturally responsive and socially meaningful.

Taken together, these recommendations reveal that participants see ethnobotany not simply as a topic about plants, but as a framework for reimagining science education—one that links scientific understanding with local knowledge, environmental awareness, cultural identity, and community experience.

Figure 2 presents the five interrelated themes that capture how college learners make sense of ethnobotany in relation to their everyday experiences, cultural knowledge, and science learning. The figure shows that ethnobotany is understood not only as practical and transmitted plant knowledge, but also as a bridge between traditional and scientific ways of knowing, a context for meaningful and culturally grounded learning, and a site of negotiation where learners evaluate, validate, and reinterpret plant-based knowledge. Collectively, these themes highlight ethnobotany’s potential to enrich science education by linking learners’ lived realities, environmental awareness, and cultural heritage with formal scientific understanding.

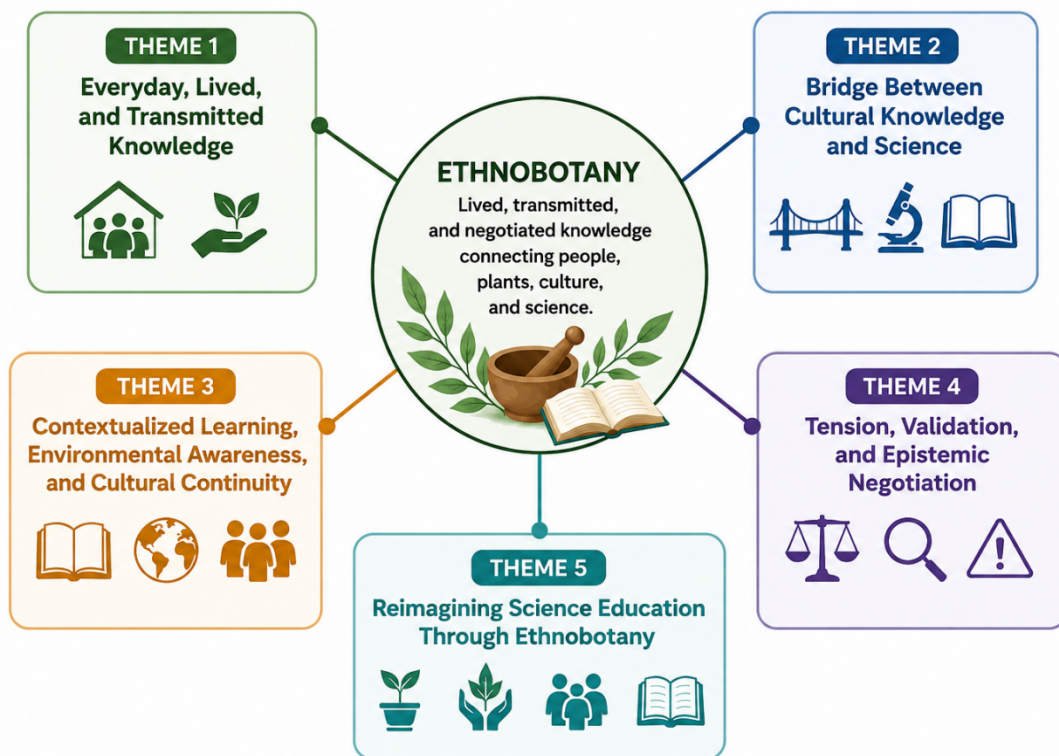


Figure 2. Five interrelated themes on the meanings, experiences, and relevance of ethnobotany among college learners in the Philippines

Discussion

Persistence and Transmission of Ethnobotanical Knowledge Among College Learners

A central contribution of this study is the finding that ethnobotanical knowledge remains present and meaningful among college learners despite their immersion in formal schooling, digital media, and modern information environments. The ethnobotanical documentation showed familiarity with 38 plant species across 24 botanical families, with *Vitex negundo* L. (lagundi), *Psidium guajava* L. (guava), and *Blumea balsamifera* (L.) DC. (sambong) cited by all participants, and *Euphorbia*

hirta L. (tawa-tawa) and *Moringa oleifera* Lam. (malunggay) cited by most. These were not obscure or specialized plants; rather, they were species closely tied to household care, food preparation, and the management of common conditions such as cough, fever, wounds, digestive discomfort, and inflammation. Read together with the qualitative themes, the documentation suggests that participants' ethnobotanical knowledge was rooted in ordinary domestic and community life rather than in isolated recollections or textbook exposure alone. This pattern is consistent with Philippine ethnobotanical studies showing that medicinal and food plants continue to occupy an important place in local health practices and family-based caregiving traditions (Dapar *et al.* 2020; Tanalgo *et al.* 2024; Plang *et al.* 2024).

The findings also highlight the continuing importance of intergenerational transmission. Participants consistently identified parents, grandparents, and other elders as their primary sources of knowledge about plant uses, preparation practices, and culturally embedded meanings. This supports ethnobotanical scholarship showing that traditional ecological knowledge is often transmitted through observation, storytelling, caregiving, and repeated participation in everyday routines rather than through formal instruction alone (Fontefrancesco & Pieroni 2020; Haselmair *et al.* 2014). In the present study, learners did not encounter ethnobotany as detached information; they experienced it as lived and relational knowledge embedded in food preparation, illness management, environmental interaction, and family memory. Such a finding is significant because it shows that college learners do not enter science classrooms as culturally neutral individuals. They bring with them pre-existing plant knowledge and ecological understandings shaped by household practice, community experience, and culturally grounded forms of care.

At the same time, the study shows that ethnobotanical transmission among contemporary learners is not confined to family and community spaces. Schools, communities, and digital media also emerged as important knowledge sources, indicating that plant knowledge now circulates across multiple and overlapping learning environments. This pattern suggests that ethnobotanical knowledge is dynamic rather than static: it is preserved through intergenerational relationships, but also reinforced, supplemented, and sometimes reinterpreted through formal schooling and public or online information spaces (Lumpert & Kreft 2017; Mayer & Ceuterick 2022). This point is especially important in relation to the composition of the sample. Although many participants were enrolled in BS Philosophy and BSED Physics rather than plant- or biology-focused programs, all had taken biology- or environmental science-related coursework and nearly all had encountered lessons related to plants or traditional knowledge. Rather than weakening the study, this disciplinary diversity suggests that ethnobotanical familiarity may persist across academic backgrounds when learners remain connected to community-based plant knowledge and culturally grounded experiences. The findings therefore contribute to ethnobotanical research not by reporting previously undocumented plant uses, but by showing how ethnobotanical knowledge continues to circulate, adapt, and remain educationally meaningful among college learners in a contemporary Philippine setting.

This coexistence of home-based, community-based, and school-based plant knowledge can be interpreted through Two-Eyed Seeing, which emphasizes learning through the complementary strengths of Indigenous or local ways of knowing and Western science (Cirkony *et al.* 2023; McDowell 2025). Although the present study was not designed as a Two-Eyed Seeing intervention, participants' narratives suggest a form of epistemic movement across knowledge systems. On one hand, they inherited practical knowledge from family and community practices; on the other, they encountered biological explanations, scientific classification, and evidence-based reasoning in formal science learning. Rather than simply replacing one system with another, many appeared to move between them—using traditional knowledge as a starting point for understanding plant use while drawing on science to explain, question, evaluate, or extend that knowledge. In this sense, the persistence of ethnobotanical knowledge among college learners is not merely evidence of cultural survival; it reflects an ongoing process of knowledge negotiation and epistemic coexistence within plural learning environments.

Ethnobotany as a Meaningful and Contextualized Pathway for Science Learning

The findings further suggest that ethnobotany becomes meaningful to learners because it is grounded in direct experience, familiar practice, and practical application rather than encountered only as abstract information. Participants associated ethnobotany with observing plants, preparing herbal remedies, gardening, caring for household plants, and learning through family routines. These experiences enabled them to connect scientific concepts to tangible situations involving health, food, environmental care, and daily life. Ethnobotany was therefore meaningful not simply because learners could identify plant names or uses, but because these plants were embedded in lived experiences that made science concepts easier to interpret, remember, and apply. This supports previous work suggesting that ethnobotanical learning becomes educationally powerful when linked to concrete and familiar contexts rather than presented as decontextualized botanical information (Flores-Silva *et al.* 2024; Bolaños *et al.* 2026).

This finding is consistent with constructivist perspectives, which emphasize that learners actively build knowledge through interaction with their environment and through the interpretation of new ideas in light of prior experience (Driver *et al.* 1994; Moeed, 2010). Participants' encounters with medicinal plants, food crops, and environmental resources provided authentic contexts through which scientific ideas could be understood. Their narratives suggest that ethnobotany can function as a cognitive and cultural bridge between school science and the ecological worlds learners already inhabit. In this respect, ethnobotany is not merely supplementary "local color" added to science lessons; it is a meaningful knowledge base that can anchor scientific understanding in everyday phenomena, community practice, and sensory experience.

The educational value of ethnobotany was particularly evident in participants' descriptions of experiential learning. Caring for plants, observing growth and environmental responses, and preparing plant-based remedies allowed learners to relate concepts such as plant physiology, adaptation, ecological relationships, and healing properties to firsthand observations and practical situations. These findings support work arguing that ethnobotanical examples can deepen conceptual understanding when paired with experiential, inquiry-based, and contextualized learning approaches (Gutiérrez-García *et al.* 2024; Prayogi *et al.* 2023). In the Philippine setting, this is especially relevant because it suggests that ethnobotany can help address a persistent challenge in science education: how to make scientific concepts feel relevant to learners whose lives are already shaped by plant-based practices, local ecologies, and culturally embedded environmental knowledge.

At the same time, the study indicates that the meaningfulness of ethnobotany does not automatically translate into sustained classroom integration. Participants viewed ethnobotanical knowledge as educationally rich, but also recognized that such knowledge is often marginal or underdeveloped in formal science instruction. This observation aligns with Pejaner and Mistades (2020), who note that teachers attempting culturally relevant science teaching often work within rigid curriculum demands, limited time, and structures that leave little room for localized, inquiry-based, and community-linked learning. Teachers may also feel underprepared to integrate ethnobotanical content when they have limited training in culturally responsive pedagogy, local knowledge integration, or the scientific and cultural handling of plant-based examples. Thus, the issue is not simply whether ethnobotany is meaningful to learners, but whether school structures create the curricular space, teacher support, and institutional legitimacy needed for its sustained use in science teaching.

Ethnobotany as a Bridge—and a Site of Negotiation—Between Traditional Knowledge and Science

A key finding of the study is that participants generally perceived ethnobotany as a bridge between traditional knowledge and science rather than as a straightforward conflict between incompatible systems. Participants often described traditional knowledge as offering practical, experience-based understandings of plant use, while science provided additional explanatory tools for examining why practices work, under what conditions they may be effective, and where their limits might lie. In this sense, science was not simply positioned as a mechanism for "proving" or discrediting traditional practices; rather, it became one way of engaging with plant-based knowledge that learners had already encountered in family and community life (Flores-Silva *et al.* 2024; Zidny *et al.* 2020). Ethnobotany therefore emerged as more than content about useful plants. It became a pedagogical space where culturally inherited knowledge and school-based science could be brought into conversation.

This interpretation can be understood through Two-Eyed Seeing and related ideas such as the epistemology of partial truths, which recognize Indigenous or local knowledge and Western science as distinct yet potentially complementary ways of knowing (Onwu & Mufundirwa, 2020; Cirkony *et al.* 2023). From this perspective, ethnobotany creates a space for epistemic negotiation in which learners move between inherited understandings of plants and scientific explanations while recognizing that each system offers partial but valuable insights into human-plant relationships. This is important because it resists the assumption that local knowledge becomes legitimate only when it is translated into, or confirmed by, Western scientific terms. Instead, ethnobotany can be understood as a site of dialogue, comparison, and mutual illumination in which cultural practices are not dismissed as pre-scientific beliefs, but are engaged as meaningful, historically situated, and experientially grounded ways of understanding the environment (Prayogi *et al.* 2023; Sotero *et al.* 2020).

At the same time, the findings show that ethnobotany does not simply harmonize traditional knowledge and science; it also exposes learners to moments of tension, uncertainty, and evaluation. Some participants acknowledged difficulty when inherited beliefs or plant practices did not fully align with scientific explanations or empirical evidence. These moments are educationally important because they reveal that learners are not merely receiving two parallel bodies of knowledge. Rather, they are actively negotiating questions of evidence, credibility, usefulness, and cultural meaning. In this regard, science can play a valuable role not as the sole arbiter of truth, but as a tool for explanation, inquiry, and critical engagement. Participants' narratives suggest that learners use science to ask why a remedy may work, what biological processes might be

involved, where evidence is lacking, and how caution or qualification may be needed. Such a process allows learners to appreciate traditional knowledge while also interrogating it thoughtfully and relating it to broader biological and ecological concepts (Gutiérrez-García *et al.* 2024; Marsandi *et al.* 2025).

Seen in this way, ethnobotany functions not only as a repository of plant knowledge but also as a pedagogical bridge for navigating plural ways of knowing. Its value lies precisely in its capacity to connect scientific inquiry with culturally grounded experience while preserving room for dialogue, critique, and epistemic humility. Rather than asking learners to choose between “tradition” and “science,” ethnobotany invites them to examine how both can contribute to a fuller and more contextually grounded understanding of plants, health, ecology, and human-environment relationships.

Implications for Culturally Responsive Science Teaching, Curriculum, and Teacher Preparation

The findings have several implications for science education in the Philippines because they show that ethnobotany can support culturally responsive, contextualized, and community-linked science teaching. Participants consistently described ethnobotanical knowledge as relevant to home practices, community life, environmental awareness, and cultural identity. This suggests that ethnobotany offers a concrete way to situate science learning within the cultural and ecological realities that students already inhabit. In this sense, its contribution to science teaching lies not only in making lessons more engaging, but in repositioning learners’ own experiences and community-based knowledge as legitimate starting points for science learning (Bolaños *et al.* 2026; Flores-Silva *et al.* 2024).

From a culturally responsive perspective, ethnobotany can help teachers draw on students’ funds of knowledge—their familiarity with medicinal plants, food crops, household remedies, and local environmental practices—that are often overlooked in conventional science curricula. Rather than presenting science as detached from students’ lives, ethnobotany allows discussions of plant biology, ecology, health, and sustainability to begin from examples learners already recognize as meaningful. It also appears to support cultural awareness and identity formation, as participants associated ethnobotanical learning with pride in local practices, appreciation for ancestral knowledge, and a stronger sense of connection to community heritage. In this way, ethnobotany contributes not only to scientific literacy but also to cultural literacy by affirming that valuable knowledge exists within families, communities, and local ecological traditions (Marsandi *et al.* 2025; Bolaños *et al.* 2026).

The findings also suggest that ethnobotany can support environmental awareness and biodiversity consciousness. Participants associated plant knowledge with a greater appreciation of the ecological and cultural importance of plants and with a growing awareness of stewardship and sustainable resource use. These outcomes align with broader science education goals related to sustainability, environmental responsibility, and socially relevant scientific literacy (Flores-Silva *et al.* 2024; Marsandi *et al.* 2025). In the Philippine context, this educational potential resonates with policy efforts such as the National Indigenous Peoples Education (IPEd) Policy Framework, which promotes the creation of a cultural interface between community knowledge systems and formal schooling rather than treating Indigenous and local knowledge as peripheral to the curriculum (Miole 2024). Although the present study was not conducted in an IPEd-specific setting, the framework offers a useful lens for understanding why ethnobotany remains underrepresented despite its promise: meaningful integration requires not only recognition of its value, but also curricular structures that legitimize community-based knowledge within science learning.

At the same time, the pedagogical promise of ethnobotany must be considered in light of the practical realities of Philippine science teaching. Research on culturally relevant science teaching suggests that teachers often feel underprepared to indigenize science content and are constrained by prescribed competency coverage, limited instructional time, and curriculum structures that restrict the sustained use of localized and community-based pedagogies (Pejaner & Mistades 2020). For this reason, calls to integrate ethnobotany into science education must go beyond general advocacy. Curriculum developers need to identify where local plant knowledge can be aligned with existing competencies, lesson sequences, and assessment expectations. Teacher education programs—both preservice and in-service—need to provide concrete preparation in culturally responsive pedagogy, ethnoscience perspectives, and practical strategies for incorporating community knowledge into classroom instruction. Such preparation should equip teachers to use local examples across science domains, design manageable inquiry activities, and navigate tensions that may arise when traditional plant knowledge and scientific explanations do not fully align.

Overall, the study suggests that ethnobotany contributes to science education in at least three interconnected ways: it draws on learners’ existing knowledge and lived experiences, affirms cultural identity and community-based ways of knowing, and

links scientific understanding with environmental responsibility. Its significance therefore lies not only in contextualizing science concepts, but also in broadening whose knowledge is recognized in the classroom and how science learning can become more inclusive, dialogic, and locally meaningful. In this sense, ethnobotany is best understood not as an “extra” topic within science education, but as a productive framework for rethinking how science can be taught in ways that are culturally grounded, educationally relevant, and responsive to the plural knowledge worlds learners already inhabit.

Limitations and Future Research

This study should be interpreted in light of several limitations. First, the study was conducted in a single university setting and involved a relatively small purposive sample of 24 college learners, which limits the transferability of the findings to other higher education contexts in the Philippines. Second, although all participants met the inclusion criteria and had prior exposure to plant-related or science-related coursework, many were not enrolled in biology- or plant-focused programs. While this diversity is analytically useful in showing that ethnobotanical knowledge may persist across disciplinary backgrounds, it also means that the findings should not be taken as representative of college learners in general or of students with more specialized botanical training. Third, the ethnobotanical documentation relied on participants’ self-reported familiarity with plants, their uses, and sources of knowledge, while the phenomenological findings were based on narrated experiences and perceptions. As such, the study does not claim to verify the pharmacological efficacy of reported plant uses or to measure the actual classroom impact of ethnobotanical integration on science learning outcomes.

Despite these limitations, the study offers an important account of how ethnobotanical knowledge is remembered, transmitted, and interpreted by college learners in relation to contemporary science education. Future research may build on these findings by examining ethnobotany across multiple universities, disciplines, and cultural communities; comparing learners from science- and non-science-focused programs; and exploring how ethnobotanical knowledge is enacted in actual classroom settings. Further studies may also investigate how teachers integrate local plant knowledge into science instruction, how learners negotiate tensions between traditional and scientific explanations, and how ethnobotany-based lessons influence outcomes such as conceptual understanding, cultural identity, and environmental awareness. Such work would deepen understanding of ethnobotany not only as documented plant knowledge, but also as an educational resource for culturally responsive and contextually grounded science teaching.

Conclusion

This study examined the meanings, experiences, and perceived relevance of ethnobotany among college learners in the Philippines while documenting the ethnobotanical knowledge that informed those experiences. The findings show that ethnobotanical knowledge remains present and meaningful among college learners, as reflected in their familiarity with 38 medicinal, food, and culturally significant plant species and in the continuing importance of family members and elders as primary sources of plant-related knowledge. These findings suggest that ethnobotany persists not merely as cultural memory, but as a living body of knowledge embedded in everyday health practices, food preparation, caregiving, and community life.

The phenomenological findings further show that learners experience ethnobotany as practical, meaningful, and closely tied to lived experience. Participants understood ethnobotany as a bridge between traditional knowledge and scientific understanding, enabling them to connect family- and community-based plant practices with biological and ecological concepts encountered in formal education. Ethnobotany was also perceived as a valuable resource for contextualized and culturally responsive science learning because it made scientific concepts more relatable, strengthened cultural identity, and fostered environmental awareness and appreciation for biodiversity.

At the same time, the study suggests that the educational potential of ethnobotany is not yet fully realized in formal science instruction. Participants pointed to the limited representation of local plant knowledge in classroom teaching and highlighted the need for more experiential, community-based, and culturally grounded approaches to science learning. In the Philippine context, this implies that meaningful integration of ethnobotany will require not only curricular recognition, but also stronger teacher preparation, localized learning resources, and institutional support for linking Indigenous and local knowledge with prescribed science competencies.

Overall, the study concludes that ethnobotany remains relevant in contemporary science education because it provides a meaningful interface between learners’ lived experiences, cultural heritage, and scientific understanding. Its contribution lies not in reporting novel plant uses, but in showing how ethnobotanical knowledge persists, is transmitted, and is

interpreted by college learners, and how it can serve as a resource for more contextualized, culturally responsive, and environmentally meaningful science learning. More broadly, the study underscores that valuing ethnobotany in education is not simply a matter of adding local plant examples to lessons; it is part of a wider effort to create science learning that recognizes diverse ways of knowing while helping learners engage critically and respectfully with both traditional knowledge and scientific inquiry.

Declarations

List of abbreviations: MSU-IIT - Mindanao State University-Iligan Institute of Technology; WHO - World Health Organization

Ethics approval and consent to participate: Participation in the study was voluntary. Prior to data collection, participants were informed of the purpose of the study, the procedures involved, the voluntary nature of participation, potential risks and benefits, confidentiality measures, and their right to withdraw at any point without penalty. Written informed consent was obtained from all participants before the conduct of the interviews and ethnobotanical documentation activities. To protect anonymity and confidentiality, pseudonyms or participant codes were used in transcripts, notes, and the presentation of findings.

Because the study involved the documentation of plant-related knowledge that may be rooted in family, community, and traditional practices, particular care was taken to ensure the ethical handling of culturally derived knowledge. Participants were invited to share only the plant-related information they were personally comfortable disclosing, and no sacred, proprietary, or community-restricted knowledge was intentionally solicited or documented. Although the study did not directly involve an Indigenous Cultural Community/Indigenous Peoples (ICC/IP) community as a research site or participant group, it was conducted with sensitivity to the ethical principles underlying culturally grounded research in the Philippine context, including respect for cultural knowledge, voluntary participation, informed consent, confidentiality, and recognition of the ownership and appropriate sharing of traditional knowledge. In this regard, while formal Free and Prior Informed Consent (FPIC) procedures under NCIP Administrative Order No. 3, s. 2012 were not required, the study remained guided by broader principles of cultural respect and ethical responsibility in handling ethnobotanical knowledge.

Consent for publication: Not applicable

Availability of data and materials: The datasets generated and/or analyzed during the current study are available from the author on reasonable request.

Competing interests: The author declares no competing interests.

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Author contributions: V.A.M. solely conceptualized the study, collected the data, conducted the analysis, prepared the ethnobotanical documentation, and wrote, reviewed, and approved the final manuscript.

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