# Awareness and Perceptions of Permaculture Among Students of the University of the Philippines Open University: Basis for Developing and Education Program

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## Chapter 1. Introduction

### *a. Background of the study*

Sustainable ways of living can be developed through permaculture. Permaculture is an encompassing agricultural and land management design approach whose goal is to mimic the surrounding natural ecosystem. This naturalistic design decreases waste, prevents pollution, improves land resilience and biodiversity, maximizes sustainability, and protects wildlife. It can be employed by anyone, anywhere and may be incorporated into households, businesses, communities, and gardens (Metych, 2024; *What is Permaculture?*, n.d., as cited in Caubang, 2024a; Flores et.al, 2020; Peeters, 2011; Spillas, von Herzen, & Holmgreen, 2024; A Permaculture Model for the Future of Tourism in the Philippines, n.d.; Queblatin, 2022).

Institutions and communities can implement permaculture to attain sustainable outcomes. The University of the Philippines Open University (UPOU) cultivated the Perma G.A.R.D.E.N. – under the Faculty of Management and Development Studies to uphold sustainable production and consumption and to commit to *Sustainable Development Goal 2: Zero Hunger* (*FMDS Perma G.A.R.D.E.N.*, n.d. as cited in Caubang, 2024a). UPOU pioneers online education in the country. Its mission is to supply Filipinos all over the world with access to quality higher education via innovative and responsive education methods. It bolsters academic excellence, academic freedom, scholarship, social responsibility, humanism, and service to the nation (*About - University of the Philippines Open University*, n.d.).

The Perma G.A.R.D.E.N was opened to the public by UPOU's Faculty of Management and Development Studies (FMDS) on March 21, 2023. G.A.R.D.E.N. is an acronym meaning Growing Appreciation toward Resilience Development Entrepreneurship and Nutrition – appropriately describing the philosophy behind the university space. The garden serves as the

center of the sustainability in action living laboratory campus initiative. Its main purpose is to serve as a learning laboratory for students and provide fresh and organic produce to the faculty and staff of UPOU (Jabez Joshua Flores, 2024 as cited in Caubang, 2024a).

Permaculture design is founded on care for the earth, care for people, and fair share. The garden follows twelve permaculture principles that guide a slow, creative, and resourceful design philosophy. It has six zones arranged by frequency of use and amount of human activity. Such zones are allocated for medicinal plants, annual vegetables, and perennial crops among others. To create a safe haven for community wildlife, the staff compost biodegradables, harvest rainwater, and recycle plastics into eco-bricks (Ibid.).

Additionally, the multifaceted nature of the garden is leveraged as a setting to provide education and community programs. Birdwatching, drone tutorial sessions, educational tours, and assistance in thesis experimentations are available to the public. Students and professionals from various sectors have visited the Perma G.A.R.D.E.N. to develop partnerships. Communal exchanges are promoted and surplus produce is sold in small farmers markets. The "Adopt-a-Plot" program allows faculty, organizations, and students to maintain a plot in the garden. This program seeks to promote mental health resilience, healthy eating habits, and sustainability practices both inside and outside the university. A small permagarden library and permaculture gardening club is also accessible (Ibid.).

To gain a more in-depth assessment on the challenges at the Perma G.A.R.D.E.N., the researcher conducted a pre-research informal group interview with the permagarden staff last November 16, 2024. This interview serves as a context analysis and needs assessment for a future EDS 199 project. Dr. Jabez Flores, Ms. Jane Reondanga, and Ms. Raizza Alforja were interviewed about the strengths and weaknesses of the perma-garden. Dr. Flores is a FMDS

faculty member, permaculture expert and lecturer. Ms. Reondanga serves as the primary custodian of the garden, handling tours, maintenance, and other programs. Ms. Alforja is an FMDS research assistant responsible for coordination, social media management, and contributions to permagarden programs (Caubang, 2024a)

The interview revealed that there is a general lack of permaculture research in the Philippines. The interviewees share how permaculture is young and growing field in the country and sorely lacks reference literature. The staff lament that there is limited time, human, and financial resources to conduct permaculture studies at the university despite various researchable topics in the field. They hope to involve students at all levels in conducting permaculture research (Ibid.).

The assessment shed light on UPOU students' lack of awareness and appreciation of the garden. The interviewees stated that the garden is relatively young (at only around two years old) but some students compare it to more established ones. The interviewees share that the students do not see how productive the garden is despite its young age. This is both disheartening and motivating for the staff (Ibid.).

The ultimate goal of community projects from the FMDS Perma G.A.R.D.E.N. is replication of permaculture. Particularly, the interviewees hope to see replication in other barangays in Los Baños, Laguna. One interviewee mentioned how she wants to make and see more programs that promote the importance of the FMDS perma-garden and its biodiversity with the youth through art. The interviewees stated their desire for communities to see the benefits of permaculture and how its design can be adopted (Ibid.).

The FMDS Perma G.A.R.D.E.N. staff lament UPOU students' and community members' lack of awareness, appreciation, and replication of permaculture and the university permagarden.

This research seeks to identify UPOU students' perceptions of permaculture and the university permagarden in order to guide future policies to address gaps in understanding.

***b. Statement of the problem***

Permaculture provides a framework that can guide students towards environmentally-conscious practices. The UPOU FMDS Perma G.A.R.D.E.N. is a successful case of applying permaculture principles in an educational setting. Despite this, many UPOU students show low awareness for permaculture and the university permagarden. To bridge this gap, this research seeks to determine the: (1) the level of students awareness of permaculture; (2) student perceptions of permaculture; (3) the level of students awareness of FMDS Perma G.A.R.D.E.N.; and (4) student perceptions of the FMDS Perma G.A.R.D.E.N.

Research questions

1. What is the extent of students' awareness of permaculture as a concept?
2. How familiar are students with the definition, benefits, and practices of permaculture?
3. What are students' perceptions of permaculture as a sustainable framework?
4. How do students rate their familiarity with permaculture practices?
5. Are students aware of the existence of the FMDS Perma G.A.R.D.E.N.?
6. How familiar are students with the definition, benefits, and practices associated with the FMDS Perma G.A.R.D.E.N.?
7. What are students' perceptions of the FMDS Perma G.A.R.D.E.N. as a sustainability initiative?

***c. Significance of the study***

Permaculture encourages self-reliance and creative use of resources through design elements. It advocates for the practice of non-destructive food production and land use, extending to ways of both thinking and living. Ways to practice this ethical framework include composting, low-impact livestock farming, mindful land use, renewable energy use, recycling, rainwater harvesting, and gardening with crop rotation. Being an ecological design system, it contributes to solving several local and global environmental issues. Today, over three million people around the world practice permaculture. Clearly, permaculture provides an encompassing approach to sustainability – a framework urgently needed amidst the looming global climate crisis (Caubang, 2024a; Flores et.al, 2020; Peeters, 2011; Spillas, von Herzen, & Holmgreen, 2024; *A Permaculture Model for the Future of Tourism in the Philippines*, n.d.; Queblatin, 2022). The study emphasizes the importance of permaculture and the reasons for why students must be knowledgeable about it. This research adds to the limited literature on permaculture in the Philippines.

Students and the youth are crucial in fighting climate change (Rogayan & Nebrida, 2019; Tadena & Salic-Hairulla, 2021). They serve as the most productive population and are in charge of facilitating future change (Mercado & Osbahr, 2023; Lavadia et.al, 2021). Young people need to know how to take care of nature as current environmental degradation can lead to depletion of the resources of future generations (Escatron, et.al, 2023; Cruz & Tantengco, 2017; Toledo & Lingon, 2024; Pardo, 2012; WFWP Philippines - Bohol Chapter, 2022). The study increases students' awareness of permaculture as a means to design systems sustainably. It also emphasizes learning institutions' role in developing environmentally-conscious students.

It will especially aid UPOU in fulfilling its initiative in Sustainable Development Goal 2., The research indirectly introduces surveyees and interviewees to the concept of permaculture and raises awareness of FMDS permagarden. Findings from this study can be used to guide future education programs as it identifies who are most familiar and most unfamiliar with permaculture and permagarden. It will provide an assessment of gaps in understanding of permaculture using a variety of means. Additionally, despite students' knowledge of sustainable practices, actual application of this environmental knowhow is lacking. The study can highlight the target areas for the inspiration of replication.

***d. Scope and limitation of the study***

The study covers the awareness and perceptions on permaculture of the UPOU students that consented to participate in the study. It does not cover the particular permaculture practices done by students, or whether these are performed at all. This research is limited by voluntary participation, which may be unrepresentative of the whole population of UPOU. The research includes students' views on permaculture in general and on the FMDS Perma G.A.R.D.E.N. in particular. The study does not ask learners' opinions on other specific examples of permaculture projects. Viewpoints will include local and offshore students as the online surveys and interviews bridge the physical distance gaps. The answers to the questions regarding perceptions will be self-assessed and non-experimental, offering mere subjective viewpoints. To minimize subjectivity and increase reliability, the study triangulates qualitative anecdotes with quantitative answers. The study offers highly specific research for UPOU usage which may serve as a beneficial case study but has limited generalizability.

## Chapter 2. Review of Literature

### *a. Review of literature and related studies*

The researcher used her previous work, "Permaculture Made Easy: A Proposal for a UPOU MODeL Distance Education Course targeted towards the Layman", as the foundation of this paper. The work described the importance of permaculture, the challenges faced by the staff at the UPOU F.M.D.S. Perma G.A.R.D.E.N., and a possible solution to this challenge in the form of a distance education program. Permaculture was explained as a sustainable design framework applicable in schools, businesses, and homes. Both organizations and individuals can follow permaculture. The author shed light on the staff's issues in maintaining the permagarden. These include limited resources (manpower, time, and finances), low replication of permaculture programs observed in the community, and perceived low appreciation among UPOU students regarding permaculture practices and the FMDS permagarden. The interviewees also stated that few research on permaculture exists in the Philippines. To address these issues, the researcher recommended a non-formal short hybrid course on permaculture that will employ laymanized terminology. This allows for permaculture knowledge to be more accessible to non-experts and promotes contextualizing practices to the individuals' needs. The recommended course aims to empower learners to design their own local permaculture (Caubang, 2024a).

This paper is anchored on a fundamental understanding of the importance, benefits, and challenges of permaculture. The majority of literature gathered by the researcher is relevant to the Philippine context. The studies below inform regarding permaculture as a transformative framework that can be seen from many perspectives including agricultural, ecological, and societal views. Each study acknowledges the importance of permaculture in developing methods that balance the welfare of the environment, current human needs, and the needs of future

generations. The studies specifically recognize the power of permaculture to improve food sovereignty and maintain marine environments' sustainability. Two studies also explored how social networks can connect permaculture practitioners and put permaculture into the mainstream.

A 2021 study by Flores and Buot Jr., sought to describe the general structure of permaculture landscapes in the Philippines and determine the landscape components that comprise its farming systems. The research discussed biodiversity's essential part to play in sustainable agriculture. Permaculture is described as a design philosophy that actively incorporates diverse features into the farm landscape. The authors conducted the research in 12 permaculture farms in 11 provinces in the Philippines in 2018 through aerial photography and farm inventory. A modified belt transect method enabled the performance of a crop diversity survey; plant species were enumerated manually and the Shannon-Wiener Diversity Index was computed. The findings revealed that permaculture landscapes had six spatial zones: 'house,' 'cash crops,' 'garden,' 'food forest,''grazing,' and 'wilderness.' Each zone was seen to have biotic, abiotic, technological, man-made structural, socio-economic, and cultural components. All sites had high species richness, with Glinoga Organic Farm having the highest. The highest diversity was found in Aloha House. Vegetable/cereal crops dominated in 50% of the sites while 20% mostly hosted by tree/fruit-bearing crops. All sites were most abundant in perennial species with 75-95% of the total plant species. The study concluded that permaculture provided a design framework for reforming our agricultural landscapes into productive and diverse ecosystems that balance food production and human settlement (Flores & Buot Jr., 2021).

Flores et.al (2020) offer a comprehensive dissertation on permaculture in the Philippines. It covers permaculture landscape structure, practices, and perspectives. The authors not how

permaculture serves as an alternative to mre conventional, more unsustainable agricultural practices. This literature review is particularly interested in Chapter 4 of the dissertation, which discusses the different permaculture perspectives. The framework integrates agricultural, ecological, and socio-cultural viewpoints to achieve sustainability. The research analyzed 17 permaculture practitioners across 12 distinct sites. It revealed that such perspectives are separate yet complementary in designing sustainable farming systems that both preserve the environment and address food insecurity. Seven of the sites take an ecological perspective. The ecological viewpoint, which aligns with global efforts, focuses on how humans participate in larger ecosystems and values organic and biodiversity practices. These include creating bee hives from coconut husks and using native pigs for land clearing. Cuba and Myanmar follow these practices in their ecocentric approach and focus on organic agriculture respectively. Three sites follow a socio-cultural perspective. These covered permaculture beyond agriculture to encompass environmental stewardship, sustainable lifestyles, and food culture. Such viewpoints are seen in Turkey and Japan that concentrate on cultural heritage and self-development. Only two sites had an agricultural perspective. The areas prioritized agribusiness and sustainable food production. Those that practice this perspective combine natural farming and organic agriculture. Often, they put together agritourism and training workshops with crop production. This can be seen in Kenya and El Salvador. Creativity and inclusivity is fostered in permaculture as a result of these diverse perspectives. It enabled the practitioners to adjust design elements to each of their unique contexts. Socio-cultural and ecological perspectives dominated the results of the study but the agricultural point of view also holds potential for balanced sustainability. The authors recommended that future research endeavors use larger sample sizes in order to deepen and

widen the exploration of these perspectives. This can enhance the role of permaculture in being an adaptive and regenerative strategy for sustainable development (Flores et.al, 2020).

Research by Spangler and Ferguson (2021) explores how permaculture teachers and practitioners in the United States perceive permaculture. As is seen in the other studies discussed, permaculture is described as a design framework that can transform human and ecological systems into just and sustainable ones. Its flexibility enables diverse applications but brings the challenge of defining and communicating its encompassing principles in an effective manner. Three central themes were identified regarding the discourse on permaculture – scoper, scale, and constituency. The scope covers approaches from the system level that integrate cultural and ecological processes to support sustainable living. The practitioners have a wide range of definitions of permaculture. This range includes specific practices such as gardening to more general philosophies like ethical decision-making and sustainable livelihoods. Issues in the broad and sometimes abstract definition of permaculture can restrict its practical application and clarity. Some view permaculture as overly theoretical while others perceive it as a way to enact actionable change. Scale discusses how permaculture operates on both individual and societal levels. Particular practices such as the reuse of greywater as well as the wider cultural shift to sustainability is considered by the framework. It aims for regeneration of both communities and ecosystems. The research participants emphasize the significance of expanding permaculture techniques beyond land-based practices to deal with systemic challenges for it to be transformative, not rigid. Constituency is tied to permaculture's historical and cultural origins. It gathers much knowhow from Indigenous knowledge systems. As a framework, it has faced criticism for failing to wholly give credit and show respect to this heritage. Participants commiserated the phenomena that permaculture has been Westernized and commodified. Seeing

all of this, it can be said that permaculture requires decolonization. In an effort to manage these challenges, the authors recommended the adoption of alternate terms such as "ecological design" to increase accessibility and emphasize reparations and respect for the contributions of Indigenous communities. They also suggest the foundation of practices be in ethical principles – prioritizing economic and social justice, and engaging in continuous reflection and redefinition. Recognizing the role of Indigenous people's knowledge in the permaculture framework can shift it into an important tool in the promotion of just and sustainable ways of living (Spangler & Ferguson, 2021).

Peeters (2011) talks about how permaculture can help address the issue of lacking food sovereignty in the Philippines. Inadequate food supply leads to the needs or demands of the people being unmet. The author discusses how this leads to the poverty of the nation and the malnutrition of Filipinos. Several researches have been conducted by the Philippine government seeking resolutions to this issue. The paper discusses the concept of permaculture as a means to solve food sovereignty in the country. The research introduced the problem by discussing overall environmental deterioration due to corporate-capitalist-driven development and cited genetically modified organisms (GMOs) as an example of such. It explains how pollution, erosion, and other global disasters can be caused by human activities such as monocropping, deforestation, and the industrialization of agricultural production. Permaculture is explained to be a holistic design system guided by natural principles. It focuses on the relationships between elements and offers practical, sustainable alternatives for emphasizing patterns observed in ecosystems, fostering interconnectedness, and developing communities in harmony with nature. Individuals' involvement in the design of the environment shows how permaculture promotes accountability, cooperation, and ecological awareness while enabling communities' reconnection with nature. It

described the Cabiokid Foundation, a permaculture-development site in Cabiao, Nueva Ecija. Here, permaculture principles are applied in all areas and natural ways to solve a diversity of problems is nurtured. Permaculture can be applied to sustainable agriculture and ecological restoration which includes healthy food production and resource management. As such, the author successfully argues for permaculture as a powerful and transformative alternative that can help achieve food sovereignty in the Philippines (Peeters, 2011).

Spillas, von Herzen, and Holmgreen (2024) presented an article that explored permaculture as a guiding structure in the design of productive marine environments. Marine permaculture is an innovative framework for sustainable ocean stewardship; it is one solution that helps address food insecurity and climate change. Contrary to conventional marine systems, permaculture principles are integrated into design to emphasize resilience, equity, and productivity in marine socio-ecological systems. Marine permaculture is described as asserting social and environmental ethics through the empowerment of individuals and communities. It fosters resilience, reduces risks, and supports small-scale experimentation while spreading the best practices through cooperatives and networks. The authors recommend governments offer capacity-building programs, financial incentives, and streamlined marine spatial planning to improve seascape permaculture efforts. Researchers may add to these efforts as well by reviewing principles, creating sustainable metrics, and leading implementation. Although permaculture has great potential for balancing human and environmental needs, the researchers also recognize the challenges the approach faces. These include high costs, regulation barriers, and possible greenwashing. The authors recommend having mindful management to maintain realistic expectations and sustain the grassroots essence of the framework. Ecosystems and communities can reap the benefits of regenerative and sustainable ocean development by

prioritizing the holistic design and ethical pathway enabled by marine permaculture (Spillas, von Herzen, & Holmgreen, 2024).

A study by Flores and colleagues (2023) identified permaculture practitioners in the Philippines and found how network relationship patterns aid in mainstreaming permaculture in the country. The paper serves as the first systematic documentation of practitioners in the Philippines. The authors utilized social network analysis to determine network structure and uncover relationship patterns. A diverse population of 204 permaculture practitioners consisting of individuals, organizations, and local government offices were identified. It was found that the structure of the permaculture network was strategic for permaculture mainstreaming targeting a broader audience that includes both farmers and non-farmers. The study provided a useful network for creating a compendium of knowledge on permaculture. This network can be beneficial to view and connect with colleagues that have a shared research interests and advocacies. The research also highlighted the history of permaculture, added to the few studies covering permaculture in the Philippines, and the importance of pushing sustainability efforts (Flores et.al, 2023).

Obrero and colleagues (2017) looked into the socio-spatial permaculture landscape networks founded on a permaculture designer's Facebook social network. The study explains permaculture's origin as a design system in Australia in the 1970s as a response to the burgeoning environmental issues at the time. Social media has helped mainstream permaculture in recent years and is now globally on diverse landscapes. Landscape ecology and social network theory were used by the researchers to simulate and predict how permaculture designers would create invisible landscape corridors or "virtual corridors." These were determined by calculating for the Percentage Linkage Strength (%LS) metric from data gathered from two scoring systems

utilized in the study: the Permaculture Score (PS) and the Social Score (SS). 286 network nodes were found to be potential permaculture designers via Facebook Group membership. The findings revealed the top ten network nodes with the highest computed %LS which created virtual corridors. The researchers note that future studies can use the methodology to identify potential study sites for transdisciplinary permaculture research and for studying the effects of permaculture initiatives on landscapes. It also suggested that this research provides practitioners with a framework to better understand how a network of solutions individual scale could lead to larger-scale landscape patch management (Obrero et.al, 2017).

This research acknowledges the critical role of students and the youth in fighting the burgeoning climate crisis and the important role schools play in shaping environmentally-conscious mindsets. As such, the researcher collected studies that investigate students' environmental awareness and perceptions. Many of the studies also determined the environmental practices performed by the students. The researcher initially searched for students' perceptions on permaculture in particular but yielded no such results. This paper thus serves a crucial purpose in adding to the literature connecting students and their understanding of permaculture. Several studies used the Environmental Awareness and Practice Questionnaire that focused on seven environmental themes – change, diversity and stability, finiteness of resources, interdependence, material cycle, stewardship, and the balance of nature. To understand students' awareness and experiences, the majority of the studies used correlational descriptive quantitative design while one stood out in using quasi-experimental. It was seen that each school was highly varied in their students' understanding and application of environmentally-friendly practices. Most of the students in senior high schools had fair to good awareness of sustainable practices but showed much less application of such tasks. This shows that there is a gap in students'

implementation of environmental knowledge. The studies recommended improving on or creating environmental education programs based on what lapses in familiarity and practice was found. A particularly relevant suggestion is the incorporation of experiential learning for a holistic and impactful experience. Additionally, two studies examining Filipino students' view on agriculture revealed that they perceive the field as unprofitable and obsolete for contemporary needs. It was suggested to address this issue through information campaigns, curriculum revisions, and career orientations among others.

In 2017, Cruz and Tantengco assessed the environmental awareness and practices of high school students to guide the development of an advocacy program through a descriptive study. The study goes in depth in how the environment adheres to the demands of people. Sustainable development efforts are necessary for the needs of future generations. The Philippines faces many environmental issues, mentioned in particular was the extreme destructive capabilities of El Niño droughts and La Niña floods. The school system is one of the most affected by these environmental concerns. The research seeks to eliminate the problems brought by environmental degradation, specifically flood damage, by investigating students' environmental awareness and practices. It highlights that awareness is crucial for action and how education is powerful in raising awareness. 262 randomly selected fourth-year high school students from the Sta. Elena High School in Marikina, Philippines answered a modified EAS (Environmental Awareness Scale) to reveal their awareness and practices regarding the environment. The authors found that the respondents were moderately aware of the environmental concepts. Regarding their participation in environmental programs, the respondents sometimes recycle; conserve water and energy; practice non-use of harmful products; find creative possible solutions; and social media solutions. Students seldom join tree planting and join the school's environmental clubs.

Interviews with students found that despite almost the same programs about environmental care noted by the officers of the different school clubs, not all schoolmates took initiative in keeping the school campus clean. Environmental practices were done at home by students with the guidance of their parents. The study recommends that educators strengthen the integration of environmental practices, principles, and concepts in various subjects in the institutions (Cruz & Tantengco, 2017).

Escatron et. al (2023) acknowledged the necessity of environmental preservation for a sustainable future. The authors recognized the role of education in changing behavior and the responsibility of students to develop the knowledge and skills for positive societal contribution. The researchers sought to assess the environmental awareness and practices among Grade 12 students during the academic year 2022–2023 at a selected public high school in Surigao City, Philippines. Seven environmental themes (stewardship, the balance of nature, finiteness of resources, change, interdependence, diversity and stability, and material cycle) were the focus of the research. A survey instrument was adapted to gather data through quantitative correlational descriptive methodology. A correlational descriptive method with 217 respondents, mostly18-year-old females from the STEM strand, was used to reveal a significant positive correlation ($r = 0.640$) between environmental awareness and practices. The respondents demonstrated "very high" environmental awareness and "good" practices, with the Internet being their preferred source of environmental information. Students have the potential to effect change and promote sustainability through informed behaviors and innovative ideas. The research found that students' understanding of environmental issues needed to be deepened and their engagement in eco-friendly actions needed to be enhanced. To improve these areas, the study recommends solutions including expanding environmental education both within and outside

school settings, fostering a culture of compliance with environmental regulations, and integrating sustainability practices into daily life. Pollution reduction, the preservation of biodiversity, and a sustainable future may also be achieved through efficient implementation of environmental laws (Escatron et. al, 2023).

In a similar but smaller study, Punzalan (2020) evaluates the environmental awareness and practices of senior high school students as the basis for an environmental education program. The research discussed how environmental education in the Philippines is incorporated into different course curricula ranging from the various sciences to ethics and social studies as enabled by legislation. The research aimed to determine the relationship between environmental awareness and practices. 67 Filipino senior high school students in the Academic Track from a private educational institution participated in the study. Data was gathered through correlation quantitative study, total population sampling, and the Environmental Awareness and Practice Questionnaire adopted from Pardo (2012). The questionnaire focused only on four of the seven environmental themes – stewardship, finiteness of resources, change and materials, and cycle. Students were found to have a "good" level of environmental awareness ($x = 3.89$) but with "poor" environmental practice ($x = 3.47$). Nonparametric correlation analysis showed "positive correlation" between the two variables. Based on the findings, the study suggests developing environmental education programs that seek to sustain and add to the comprehension and abilities of the learners as they relate to environmental problems and environmental sustainability principles (Punzalan, 2020).

Toledo and Lingon (2024) similarly examine the environmental awareness and sustainable development practices among senior high school students. The study describes how maximizing all the available technological means in utilizing the Earth's natural resources for the

sake of convenience could drastically impact nature. With the current state of environmental degradation, education is sorely needed for humans to have the knowledge to better take care of the planet. However, stakeholders still face difficulty in imbedding the political, social, and moral responsibility of taking care of the environment into students. Relevant to the context of the study, at President Diosdado Macapagal Memorial National High School, heads face difficulty in monitoring the requirement for students to plant a tree before they graduate. With difficulties in monitoring the students' environmental practices, the research sought to find the extent of environmental awareness and the level of sustainable development practices of senior high school students at the school. Descriptive-correlational method of research was used. A validated two-part-self-made questionnaire was administered to 191 Grade 12 SHS students randomly chosen from a total population of 364. It was found that students' had high awareness of pollution, waste management and climate change and had high levels of proper waste disposal, tree-planting activities, and energy conservation. A significant relationship between "waste management and proper waste disposal", "climate change and proper waste disposal", "climate change and tree planting activities", "pollution and tree planting activities", and "pollution and energy conservation was revealed." In contrast, no significant relationship was determined between "waste management and tree planting activities", "climate change and energy conservation", "pollution and proper waste disposal", and "waste management and energy conservation." While the authors recommend crafting an intervention framework based on the findings, they did not elaborate on how the presence or lack of significant relationships between factors will guide this (Toledo & Lingon, 2024).

Rogayan Jr. and Nebrida (2019) studied environmental awareness and practices among science students as an input for an ecological management plan. The authors recognize the

importance of schools in developing environmentally-aware and ecologically-conscious learners. The research discussed how climate change is a global concern. Amidst rapid degradation of nature, environmental education is a powerful tool to combat this. Multiple relevant agencies, aided by consultation with experts on the environment and the academe, head the implementation of public education and awareness programs on environmental (RA 9512, 2008 as cited in Rogayan Jr. & Nebrida, 2019). Additionally, the authors add how science education is crucial in building environmentally-conscious students. The research also sheds light on related foreign and local studies. Foreign studies have focused mainly on the environmental awareness and practices of college and high school students, how college students' perceptions relate to their courses and area of residence and on motivations. On the other hand, local studies focused on the environmental awareness and practices of high school students as for disaster preparedness, awareness and practices in green technology of college students, and the environmental awareness of graduating college students. Anchored on the National Environmental Awareness and Education Act of 2008 (RA 9512), this descriptive-correlational research assessed the level of awareness and practices of 100 Science students from a public secondary school in Zambales, Philippines. The study revealed that the students are very aware of environmental issues and problems; and very aware of environmental concepts and state of the environment. Taking action to solve environmental problems was done often while the need to possess a high degree of commitment was practiced sometimes. A moderate correlation between students' "awareness on environmental concepts and issues" and their "practices to solve the environmental problems" and "possess a high degree of commitment" was found. The authors recommended the implementation of information dissemination programs covering environmental concepts, state of the environment, and ecological issues at the school to maintain

the high ecological awareness among the students. Specific solutions were offered such as institutionalizing environmental advocacies and eco-movements through student organizations such as the YES-O and Science clubs. A crafted ecological management plan is recommended to be conducted in order to increase students' commitment towards ecological conservation (Rogayan Jr. & Nebrida, 2019).

Tadena and Salic-Hairulla (2021) discuss the promotion of environmental awareness through and by integrating environmental education in public and private schools through the mandate of Republic Act 9512. A new perspective on STEM education aids students by using the local environment as a means for developing understanding on several environmental problems. It is argued by the authors that the provision of adequate STEM and environmental education will increase everyone's appreciation for their relationship with the environment, leading to environmental awareness and the creation of a sustainable future. The researchers aimed to develop Local-Based Lessons on Environmental Education via integration to STEM lessons in order to raise environmental awareness among Grade 8 students from Marawi City National High School. The authors offered an 11-step flowchart that outlines the development of local-based lessons on environmental education from the identification of the topic to its implementation. Quasi-experimental qualitative study supported by the two-group pre-test-post-test design was employed to investigate the effectiveness of the Developed Local-Based Lessons on Environmental Education. The control and experimental groups showed a significant difference, with the experimental group achieving higher scores than the control group. A significant difference is noted from the gain scores. Therefore results show that the Developed Local-Based Lessons on Environmental Education, integrated into STEM lessons improved the learners' environmental awareness effectively (Tadena & Salic-Hairulla, 2021).

A study by Pardo (2012) explores the environmental awareness, practices, and attitudes of selected students from the University Of Northern Philippines (UNP) regarding seven environmental themes: balance nature, stewardship, change, finiteness of resources, diversity and stability, material cycle, and interdependence. Similar to the other studies, the author highlights the negative consequences of continuous environmental destruction and the role the youth has in environmental stewardship and in shaping a more sustainable future. Descriptive survey-correlational research design was used. The data was treated with frequencies and percentages, mean, and correlation analysis. The study found that the respondents have a very high level of environmental awareness and good practices on the general environmental themes. Surveyees did not favor quarrying, use of inorganic fertilizer, the cutting of trees, forest burning/forest fires, road widening, squatting, mining, hunting, river drilling, and industrialization. A significant relationship between the awareness and practices of the respondents along the seven environmental themes was revealed by correlation analysis. The author recommended improving environmental awareness, practices, and attitudes further by developing an environmental education program and the strict implementation of the policies protecting the environment in the University (Pardo, 2021).

Mercado and Osbahr (2023) explore Filipino youth's viewpoint on agriculture. The study described Filipino youth as having an essential role in ascertaining the growth and sustainability of the agricultural industry. This is especially the case as Filipino farmers are on average aged 57, signaling a declining workforce and aging demographic. Those from the younger generation are more likely to adopt innovative practices, as such, decreasing interest in agriculture among the youth significantly threatens agricultural productivity. Disinterest in agriculture is observed globally due to its perceived lack in meeting contemporary lifestyle expectations. Locally,

participation in agriculture by the youth declined by 30.1% from 1998 to 2000. Filipino youth have low agricultural knowledge and limited awareness of agricultural professions even though they possess potential as key stakeholders in sustainable development. Several young people have positive perceptions in agriculture's inclusiveness and significance but economic concerns such as perceived societal recognition and low profitability limit their engagement with the discipline. The researchers conducted a case study in General Santos City to investigate the impact of socio-demographic factors, learning experiences, and perceptions in shaping youth's decisions to pursue careers in agriculture. The authors were guided by the Social Learning Theory of Career Decision-Making and the Social Cognitive Career Theory. It was revealed that social participation, age, and personal perceptions are positively linked to enrollment intentions. On the other hand, negative economic perceptions deter interest. The research recommended that policies offer experiential learning opportunities, accurate societal representation of agriculture, and early, curriculum-integrated intervention programs to improve engagement among youth. Additionally, industry stakeholders are emboldened to improve the agricultural sector by ensuring viable career paths (Mercado & Osbahr, 2023).

Lavadia and colleagues (2021) examine freshmen students from the University of the Philippines Los Baños (UPLB)'s perceptions on agriculture, with particular interest in the primary challenges and solutions. The study highlights how youth is the foundation of the future workforce. However, students usually see agriculture as a "poor man's job." The youth are essential in advancing the agriculture sector, especially in developing countries, as they are the most productive group. Filipino youth have relatively low enrollment into Agriculture, Forestry, and Fisheries programs compared to other courses such as Business Administration; and Education Science and Teacher Training. This resulted in agriculture experiencing a downward

trend in popularity in the Philippines especially among the youth. 832 freshmen students enrolled in the Introduction to Agriculture course from 2009 to 2014 were surveyed to find out how the youth see agriculture as a field and its university degree program. Quantitative content and correlational analysis revealed that students' demographic characteristics (age and gender) were positively correlated with their perception of agriculture. It was found that most (58.3%) of the surveyees initially held a negative attitude towards the agriculture program. As the student learns more about the agriculture field, they view the discipline more positively. Unlike the common belief that agriculture is mostly dominated by men, most of the students enrolled in the course are female (63%). 60.5% of students hail from CALABARZON; the authors highlight proximity as a consideration in university choice. Students are concerned about decreasing farmland and have narrow views of agriculture, which discourages interest. The authors recommend making Agriculture more attractive to youth by developing information dissemination (i.e. ICT-based modalities, infomercials) and interactive campaigns that promote the discipline. Curriculum revisions, career orientations, youth campaigns, digital media outreach, and incentives such as scholarships are also recommended to reshape perceptions and strengthen agricultural education in the Philippines.

The FMDS permagarden at the University of the Philippines Open University is only one of the many successful cases of permaculture in the Philippines. The researcher compiled other cases of such in the country. Additionally, some examples of permaculture education were also gathered. The following resources show how permaculture practices can be incorporated into businesses, how traditional Indigenous knowledge is related to permaculture, and how organizations can educate the public on permaculture.

Punta Riviera Resort in Bolinao, Pangasinan follows the permaculture model. While it has not achieved full sustainability, it has measures for its eventual success. Punta Riviera follows the permaculture code: care for the earth, care for people, and share the surplus. It is equipped with an organic education tower, a water filtering facility, a sustainable free range farm, and solar electricity. It supports the preservation of the local environment through mangrove replanting and using organic fertilizer. It is soon to build a permaculture structure for indigenous wild boar. It has environmental systems in place to reduce energy consumption, reduce water usage, and reduce waste. The resort shares with the local community through multiple ways, including employment of primarily local staff, weekly charity feeding, and use of local goods and materials among others. The resort holds impressive achievements and ambitious goals; however, its website does not have dates for the facility's plans. Consequently, the success or maintenance of permaculture efforts cannot be assessed (*A Permaculture Model for the Future of Tourism in the Philippines*, n.d.).

An article by Queblatin (2022) focuses on how ethnic communities in the Philippines can positively affect and be positively affected by permaculture. The author argues that integrating permaculture with Traditional Ecological Knowledge (TEK) in climate-vulnerable indigenous communities in the Philippines emphasizes the role of local wisdom in regenerative practices. "Principle 0", as proposed by the writer, references ecological and cultural knowledge before using the 12 permaculture principles. Through this principle, humans' relationship with ecosystems can be rethought. Systems are designed to align with both ecological and cultural narratives, maintaining the sacredness of nature. The article discusses how the pandemic highlighted the need for digital and print materials for permaculture education, as well as the necessity for translating materials into Filipino's mother tongues. It also discussed how Western

frameworks often overlook Indigenous traditions such as rituals for tree-cutting or planting, which often showcase ecological wisdom. The author notes how Indigenous communities protect 80% of the world's biodiversity and are crucial in leading and designing regenerative solutions.Communities must document and share their stories in order to empower themselves. With Principle 0, cultural narratives and belonging are integrated into permaculture. As such, TEK validates indigenous practices as inaugural forms of permaculture. Collaborative efforts in displaced communities, such as the Maranao IDPs in Marawi, can use the environment to heal and restore cultural identity and emotional well-being. The work highlights the important overlap of indigenous wisdom, modern ecological frameworks, sustainability and culture (Queblatin, 2022).

The Women's Federation for World Peace and 10,000 Heroes United created a two-day Permaculture Literacy Program held on March 26-27, 2022, at the CWaCe Center in Carmen, Bohol. The event had the theme *"Permaculture: The Linchpin to Food Security and Regenerative Healing of the Planet,"* and was able to host 44 participants, including among others teachers, agricultural technologists, and youth volunteers. The program aimed to educate attendees on permaculture principles, highlighting the interconnectedness of humans and nature. The program included an introduction to permaculture, design principles, and vermicomposting techniques. Those that joined also presented their permaculture design projects polished throughout the program. The event highlighted the urgent need for adaptive strategies such as permaculture to fight climate change and encouraged developing a *"Learn. Unlearn. Relearn"* mindset (WFWP Philippines - Bohol Chapter, 2022).

***b. Theoretical perspective***

The researcher adheres to emancipatory environmentalism in her assertion of the importance of permaculture in contemporary society. Environmentalism is an ethical and political movement that aims to improve and maintain the quality of the natural environment by changing human activities that are environmentally harmful. This is done through the adoption of various political, economic, and social organizations that are necessary or conducive to the better treatment of the environment; humanity's relationship with nature is reassessed. Environmentalism contends that all living things, not only humans, and the whole natural environment deserves consideration in the morality of social, political, and economic policies. In particular, emancipatory environmentalism advocates developing small-scale systems of economic production that are more closely integrated with how surrounding ecosystems naturally processes. The interconnectedness of natural systems is emphasized. As such, productive processes must work with nature, not against it. This movement encourages using organic and renewable resources over synthetic products. However, its small-scale and decentralized approach has been criticized as unrealistic in highly industrialized and urbanized societies (Elliot, 2024).

Understanding students' awareness, perceptions, and practice of permaculture can lead to the development of a contextualized environmental education program that can imbue them with the knowledge, skills, and attitudes they lack. Praxis**,** or reflection and action combined, is central for accomplishing environmental sustainability. Pollution, biodiversity loss, global warming, and climate change are largely affected by human behavior. Behaviorist theories such as Sterns' Value-Belief-Norm Theory, submit that one's personal norms guide pro-environmental actions when the individuals feel a sense of responsibility for consequences. The youth must be

empowered to actively engage in decision-making and advocacy regarding the environment (Cruz & Tantengco, 2017).

***c. Conceptual framework***

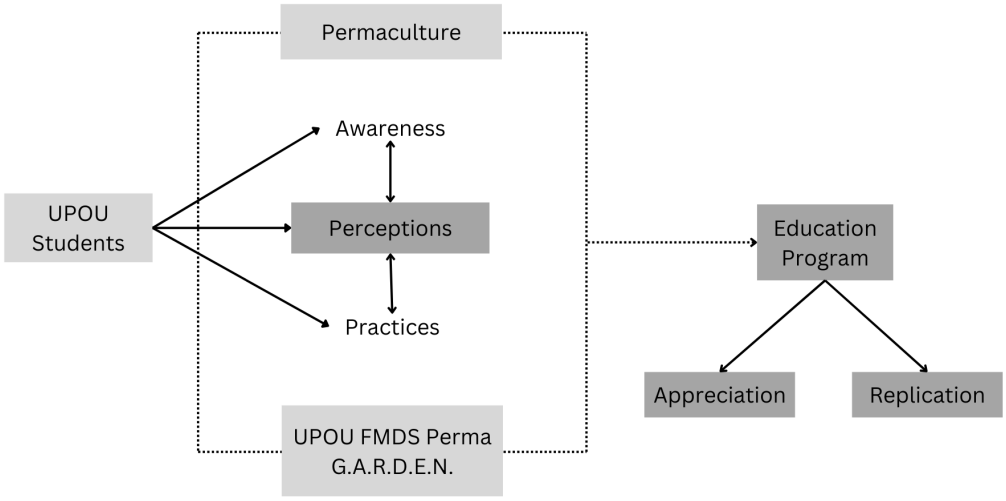


Fig. 1. Conceptual Framework

The conceptual framework shows how UPOU students' awareness, perceptions, and practices of permaculture and the UPOU FMDS. Perma G.A.R.D.E.N affect and are affected by each other. Understanding these facets may guide an education program that results in more appreciation and replication of the university's garden and of permaculture as a design framework.

***d. Operational definition of the variables and key concepts in the study***

- **Awareness** – knowledge of existence
- **FMDS Perma G.A.R.D.E.N.** – a garden at UPOU that follows permaculture principles and provides fresh and organic produce to the faculty and staff of UPOU; the center of the sustainability in action living laboratory campus initiative; serves as a learning laboratory
- **Perceptions** – views, ideas, or interpretations of a phenomenon
- **Permaculture** – a design framework that integrated with the elements of the natural environment in order to balance
- **Permagarden** – shorthand for FMDS Perma G.A.R.D.E.N.
- **Practices –** actions actively done
- **University of the Philippines Open University (UPOU)** – setting of the study; where the permagarden is situated

## Chapter 3. Methodology

### *a. Research design*

The study will use convergent parallel design. This mixed method design simultaneously collects quantitative and qualitative data to understand the problem from multiple perspectives. The design can reveal nuances in participants' ideas, combine the benefits of qualitative and quantitative research, and improve the validity and reliability of findings (*Convergent Parallel Design*, n.d. & Ponce & Pagán-Maldonado, 2015 as cited in Caubang, 2024c).

Quantitative data will be collected via surveys with Likert scale, binary, and multiple choice questions while qualitative data will be gathered through open-ended inquiries on the questionnaire. A second phase of data collection will be done through semi-structured interviews with volunteers among the survey participants.

### *b. Sample and sampling procedure*

Data will be collected from a voluntary sample of UPOU students. To widen the survey's reach, the researcher will request aid from the UPOU Information and Communication Technology Development Office (ICTDO) to mass email all UPOU students an invitation to answer the questionnaire. Additionally, faculty-in-charge will be requested to post the survey link to their class announcements and endorse it. An invite to answer the questionnaire will also be posted on the UPOU student hub. The researcher will wait for responses up to two weeks after survey dissemination.

***c. Instrumentation***

The primary research tools that will be used are a survey and an interview guide. The instrument questions are based on what knowledge can best guide permagarden staff in raising awareness, appreciation, and replication of permaculture and the university garden. The interview guide and survey will be validated with the UPOU permagarden staff and permaculture experts.

The survey will be created through Google Forms and distributed via email and posted as a link on MyPortal. All questions except for the conditional and invitation ones are required to be answered. After ticking a checkbox indicating consent of data use for research, the interviewees will be asked a short set of demographic questions such as age, city and province where they are based in, sex at birth, gender, occupation, UPOU course code, and year level.

Respondents will be asked a series of questions on their perceptions of permaculture. The survey will ask them to rate their agreement (highly disagree, disagree, agree, or highly agree) on some statements on their awareness of permaculture (e.g. “I am familiar with the concept of permaculture; “I believe that permaculture is important”). Multiple choice questions (e.g. “What is permaculture?”; “Select all the benefits of permaculture”) worth a total of ten points will ask respondents features about permaculture to triangulate this data. Additionally, binary and conditional inquiries regarding respondents’ awareness of the FMDS Permagarden (e.g. “Have you ever visited the FMDS Perma G.A.R.D.E.N.?: “If yes, what are your thoughts on it?”) will be asked. Near the end of the survey, an open-ended question asks what respondents’ understanding of permaculture and its benefits is. The last question is an optional invitation to place their email for a follow-up interview.

Follow-up interviews will be conducted online, one-on-one, recorded, and semi-structured. After confirming consent, the interviewer will ask the participant to briefly introduce themself (e.g. age, occupation, course at UPOU, etc.). They will be asked to describe the definition, benefits and practices of permaculture in their own words. The interviewer asks how they learned about permaculture and what UPOU can do to improve the participant's knowledge on such. The interviewer will also inquire about the student's thoughts whether they would replicate permaculture practices and the reasons behind such. The interviewees will also be asked whether they have visited the FMDS Perma G.A.R.D.E.N. and what they think of it.

***d. Data analysis procedure***

The research will use quantitative descriptive analysis and frequency to uncover patterns and trends from the dataset (*What is Quantitative Data Analysis?*, 2024, as cited in Caubang, 2024b). These methods can analyze the surveyees' self-assessed ratings, scores on permaculture features, and demographic characteristics. Through central tendency measures, the research can determine the characteristics of an average participant and the participants' average level of awareness of permaculture. Analyzing the frequency of answers can also reveal which permaculture features participants are least and most familiar with.

Semantic thematic analysis will be used to analyze the qualitative data gathered from the surveys and interviews. This analysis technique takes the data at face value as it is explicitly stated (Dovetail Editorial Team, 2023). It can determine the underlying themes of participants' views on permaculture and the FMDS Perma G.A.R.D.E.N.

Triangulation will be formed for mixed data analysis. This will be performed in order to validate the quantitative and qualitative data collected with each other. The validity of the data increases with triangulated data (Caubang, 2024c).

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