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DEVELOPMENT OF AN INTEGRATIVE FRAMEWORK FOR AGRICULTURAL LITERACY IN THE K-12 CURRICULUM

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ABSTRACT: *One of the key objectives of the country in the battle against hunger should be the development of students' competence and abilities, which should include agricultural literacy. The study's main goal was to create an integrated framework that took into account the sustainability and seasonality challenges that come with distributing and integrating agricultural literacy into K–12 curricula, as well as the identified underlying concerns and problems. Key informants identified 3 collaborating schools along Pili. These include Felix E. Villamer High School (SJPNHS-Annex) in Del Rosario, Pili National High School in Pawili, Pili, Rodriguez National High School in Cadlan, and Pili National High School in Pawili. Results showed that agricultural literacy integration was necessary, especially in schools offering Horticulture Strand. The needs to further strengthen students' involvement in agriculture through creating innovative and interactive interventions was also put into account.*

Keywords: Agriculture, K-12 Curricula, Integrative Framework, Agricultural Literacy

INTRODUCTION

Food security has been one of the main challenges in the Philippines as we continue to face the aftermath of the pandemic (Angeles-Agdeppa, 2022). Reports were issued on the agricultural constraints suffered by the Philippines from the year 2020-2023 that pose a grave threat in international settings (Sanchez, 2015). The Philippines relied on its own agriculture to produce one of the world's most abundant, less expensive food supplies (Birkenholz & Stewart, 1991); however, as the pandemic arose, there was a gradual decline in agricultural production in our country.

The integration of agricultural literacy into the K-12 curriculum has become crucial as urbanization continues to impact the agri-food sector (Powell et al., 2008). This integration is particularly vital as parliamentarians and society face increasingly complex agricultural decisions (Kovar & Ball, 2013). However, many secondary school students lack adequate agricultural skills due to insufficient agricultural literacy (Cosby et al., 2022) in the K-12 Curriculum implementation.

The widely accepted definition of agricultural literacy, as outlined by Frick, Kahler, and Miller (1991), has generated considerable discussion but limited consensus due to philosophical and political differences.

The theoretical framework for integrating agriculture into the K-12 curriculum is grounded in two fundamental theories. First, Beane's (1997) Interdisciplinary Learning theory suggests that agriculture can serve as a conduit for interdisciplinary education, enabling students to connect concepts across sciences, economics, social studies, and technology. Second, Kolb's (1984) Experiential Learning theory emphasizes the importance of hands-on, participatory experiences in education, incorporating cognition, environmental factors, and emotions in the learning process. This integration aligns with Dewey's (1938) assertion that schools should teach students to acquire knowledge and thinking skills through real-life problem-solving experiences.

The integration of agricultural literacy is particularly relevant to achieving food security and sustainable agriculture (UN Statistics Division, 2019). As Rice and Kitchel (2017) note,



preparing students for work and college remains a primary goal of agricultural education teachers. Additionally, Njura et al. (2020) assert that teaching strategies in secondary schools should focus on enhancing students' knowledge of production economics, accessibility, food safety, and nutrition. Through integration, students better understand the connections between academic learning and real-world agricultural contexts, with teachers recognizing the benefits of providing integrative learning opportunities (Stubbs & Myers, 2015). This study aims to develop an integrative framework for agricultural literacy in the K-12 curriculum, addressing the challenges of sustainability and seasonality while promoting food security and agricultural preservation in the Philippines.

METHODOLOGY

This research employed a case study approach to achieve its objectives. The case study method was selected as it enables examination of complex phenomena within their natural settings, thereby increasing understanding of the scenario under investigation (Hamel, 1993). This approach was particularly relevant for understanding the potential integration of agricultural literacy within the K-12 Curriculum framework.

Participant selection utilized purposive sampling, a technique widely employed in qualitative research to identify information-rich cases pertinent to the phenomenon of interest (Palinkas et al., 2015). The study population was stratified into two primary groups: key informants and participants. Key informants included the Education Program Specialist for TLE from the Schools Division of Camarines Sur and Public Schools District Supervisors from both Pili East and West Districts. To ensure data reliability and validity, cross-validation was conducted through interviews with selected school heads and students from participating schools within the delimited study area of Pili District (East and West).

The participating schools were identified through key informant recommendations. To enhance data validity, representative interviews

were conducted at these institutions to corroborate key informant responses. All interviews were audio-recorded with participants' informed consent, and subsequent member-checking was implemented to verify response accuracy.

The data collection process began with participant orientation regarding the study's content and securing informed consent. Interview protocols were developed in English with Filipino subheadings for key informants, while Bicol-Filipino language was employed for student interviews to establish rapport and ensure comprehensive understanding. As May (1997) notes, semi-structured interviews allow participants greater freedom in response articulation while maintaining comparative structure. Kumar (2005) supports this approach, particularly for investigating complex and sensitive topics, as it enables thorough preparation and in-person explanation of intricate questions. The quality of data collection was influenced by interviewer expertise, competency, and dedication (Kumar, 2005).

Post-collection, data underwent transcription, coding, and thematic analysis, supplemented by relevant literature to strengthen interpretations. Participant confidentiality was maintained through a coding system, with identifiers detailed in the appendix.

RESULTS AND DISCUSSIONS

The study identified three cooperating schools in Pili that demonstrated both progressive educational approaches and the capacity to integrate agricultural literacy into their K-12 curricula: Pili National High School (Pawili), Rodriguez National High School (Cadlan), and Felix E. Villamer High School (SJPNHS-Annex) in Del Rosario. These institutions, as confirmed by primary informants, have implemented specialized strands in Horticulture and Animal Production, demonstrating their commitment to agricultural education.

Analysis revealed that agricultural concepts were not confined to dedicated agricultural courses but were strategically incorporated across both academic subjects and Technical-Vocational-Livelihood (TVL) components. This

cross-curricular integration manifested through the use of agriculture-based examples, products, and real-world applications, effectively fostering student appreciation for agricultural principles beyond traditional boundaries.

The investigation, drawing from extensive interviews with Key Informants and subsequent validation by school representatives, yielded three principal themes with corresponding sub-themes regarding the potential integration of agricultural literacy in the K-12 Curriculum. These thematic findings provide a framework for understanding the opportunities and challenges in implementing comprehensive agricultural education within the existing educational structure.

Building Desires: The Needs for Agricultural Literacy in Schools

Agricultural literacy is crucial in developing students' understanding and appreciation of agriculture while supporting national goals of food security and agricultural preservation. As defined by Frick et al. (1991, p. 52), it refers to having comprehensive knowledge of food and fiber systems, enabling individuals to effectively process and communicate agricultural information.

K1: *"Magayon ang agriculture. Ini ngani ang sarong macroskill na kulang na sa generation ngunyan. Dikit na sana ang students na nagugusto nin pagtatanom"* ("Adopting agriculture in schools is nice. It is one of the macro skills that this generation lacks and only few students are into farming")

K2: *"Ako, very positive and supportive ako sa pag-integrate kan agriculture literacy lalo na sa mga studyante sa JHS at SHS magayon бага na ugwa kani"* ("I am very positive on the possible integration of agricultural literacy especially in honing the skills of both the JHS and SHS students")

K3: *"Kanpanahon bagada ekamakakagraduate kapag mayo kang plot. Kami kadto sa CSAC, requirement ang makagibo nin duwang plot tsaka makapatambo nin tinanom bago maka marcha"* ("During the old days, a student of CSAC won't be able to graduate without having to accomplish and create individual plots. It was mandatory to at least create two plots and

be able to grow plants before graduation.")

P3: *"Actually, agriculture is too broad. Bako sana ini sa pagtatanom ta kadakol bagang components ang agriculture na maintindihan kudta kan eskwela kung ini ipapasabot sainda maski si basic context sana"* ("Actually, agriculture is too broad. Agriculture is not just about planting crops. There are components that students should understand when it comes to agriculture and it is possible if they are literate enough to at least get the gist of its context")

P1: *"Kadto po ma'am kan Grade 8 pa kami, naggibo po kami nin garden sa likod po kan classroom, urualdaw mi itong tigbububuan tapos kada aldaw may naka-assign na grupo n aiyo ang masighid at mabubo.... magayon po kuta na arog man kadto sa kada grade level"* ("During our Grade 8, we were tasked to create a garden at the back of our classroom. We were in-charge to water it every day and groupings were assigned to maintain the cleanliness and take care of the garden. It would've been better if all grade levels can adopt it also")

Exposing students to become agricultural literate in simple activities and programs provided in schools is also necessary. It is essential to cultivate agricultural literacy in school-aged children through formal education (Cosby, 2022).

R3: *"Minsan pati ang mga studyante ultimo pagpurot basura bago magluwas sa gate, dae na tatao...pag sinugo mo man magtanom, halimbawa ngaya under kan science na competency, matanom sana as part kan requirement tapos after 1 week, magagadan na ta dae man binububuan"* ("There are even times when students have hard time picking up pieces of trash before going out even when they are asked to plant, as a part of their competencies in science for example, they would only do it as a requirement but after a week, the plant dies because students fail to water it")

E2: *"Sa ngunyan po, since napuon puon pa sana si school mi, magayon talaga na ang foundation kan mga aki ugwang maski kadikit na integration kan agriculture"* ("Since the

school has recently been established, it is good to adopt agriculture as one of its foundations”)

According to Meischen and Trexler (2003), agricultural literacy is the capacity to think critically and make value judgements about the impact of agriculture as an economic and environmental activity as well as the concomitant societal and political pressures that come from those judgments. The desire to create schools that hones holistic education should now begin by motivating students and allow them to understand the goals and relevance of agriculture to their daily life.

Goals of Agricultural Literacy

Early exposure to agriculture can help youngsters understand how it affects their environment and teach them other crucial life lessons. Agriculture is since all living things go through a cycle of growth, life, and death (Woodstream Corp., 2021).

K1: *“Tubod daw kayo ako na ang pagtabang sa mga studyante na makanuod lalo na sa mga arog kaining magagayon na initiatives mas mapaparahay kung imbwelto ang mga aki. Mag mentor, dae maging maimot makanuod mag-share kan nanudan asin magdangog din sa mga experience ninda. Iyo an ang goal kan bawat paratukdo na ma-impart kung бага, an lifelong learning”* (“I honestly believe that helping students learn these positive initiatives would also involve the efforts of the students. Mentor them to learn and at the same time, do not be selfish and learn from their experiences as well because that is the goal of every teacher who wants to impart lifelong learning to their students”)

R2: *“Pag sinabi mo kaya na agriculture, dapat maintindihan man kan mga studyante na bako sana an basta-batang matanom ka lang. Kaya kaipuhan iimprove ang literacy kan mga eskwela pagabot sa agriculture ta nagkakaugwa lugod misconception pagabot sa arog kaining topic”* (“When we talk about agriculture, students must learn that agriculture is not just simply about growing plants. The more reason for schools to improve agricultural literacy to avoid misconceptions about it”)

P2: *“Maray ngani na ang mga estudyante agko lamang maski dikit na pagkaaram sa paggabi, ta amo бага kaya ang nauuso nguwan. The earlier the better kung бага. Pag mas amay sindang na expose sa agriculture, lalo na sadi lugar namo kadakol uumahan, ang mga kag-igin amo man ang mga parauma, maray ng makanuod man lang sinda”* (“It’s a good initiative for students to have at least the basic knowledge in agriculture. Exposing them to agriculture at an early age would allow them to appreciate agriculture more especially that our place has a rich farmland and many of our parents and guardians farm for a living. It’s better if they can also learn these skills”)

Since everyone relies on agriculture, integrating agricultural literacy allows the sustainability of these natural resources. At the same time, developing students' minds is essential, especially through caring and sustenance of young agricultural minds. While agriculture is intertwined with many other disciplines, there is only sometimes a clear educational focus for students. Thus, the need to further increase students' capacity to integrate agriculture with the knowledge students should be given emphasis.

K2: *“Kita бага sa Deped puon pa kan kapanahunan, we adopt agriculture in some of our disciplines. Citing examples taken from real-life scenarios kaya mas nagiging conversational ang satuyang pagtutukdo. Kaso ngunyan kaya, siguro na dara naman kan kadakol na interruptions at gibo kan mga eskwela pat ikan mga teachers, dae naman gayo natutukan ini”* (“We, in Deped, have been adopting agriculture ever since especially within and across various disciplines. Citing examples taken from real-life scenarios to make the discussion conversational and interactive was done however, due to interruptions and overloads, students as well as teachers cannot fully focus more”)

R1: *“Ako po ma’am, ok sana man sako ta kadto po begang panahon bago magka-covid ugwa naman kaan kaso dae lang talaga na-sustain lalo na pag naiba naman si grade level napapabaya naman”* (“Prior to Covid-19, we had rudimentary agricultural activities at

school, but the school lacked sustainability, especially when students started to advance")
E1: *"Sa klase mi po kaya, kada hapon nataong oras si adviser mi po na mag-garden"* ("In our class, the adviser gives allots time for gardening")

P1: *"Si principal mi po mismo iyo pa an ang mahihiling mo po na naggabi-gabi kada aga. Kapag nahihiling mi po siya, natabang naman lugod po kami kaya abot ngunyan maski iba na po si principal, nakasanayan na po na mag-garden kada aga at hapon"* ("Our principal initiates gardening every morning. Whenever we see her garden, we help her even after we had a new principal, we initiate on gardening every morning and afternoon")

Reasons for the Integration of Agriculture: The Needs for Practical Applications

Rodriguez National High School, a large institution with 1,900 students in Pili West District, has demonstrated excellence in student achievement, administration, and overall performance. While the school promotes agricultural literacy through its Gulayan sa Paaralan program, the pandemic has led to decreased student engagement with agricultural education, highlighting an urgent need to reinforce agricultural literacy initiatives in schools.

R1: *"Kan naging SSG president ako ma'am, gusto ko sana makagibo nin mga dakol na programs saro na po si pagpapagayon kan school ta magayon po di'ba na may mga halaman man sa school tsaka sa dati ko pong hinalean na school, mayo pong garden ta puro sana mga building"* ("Right after I become the SSG president, all I wanted to do is to create programs for the school and this also includes beautification of our surroundings. It is nice to see plants and gardens inside the campus because in my previous school, all you can see are buildings")

K1: *"Ay ang Rodriguez baga saro sa mga progressive schools igdi sa Pili. Kadto ngani pirmi bagang nanggagana ang school ta sa mga contest, sa Wins mga arog kayan kaya saro in isa mga Best practices ta. Ugwa man na ibang schools na very good*

ang implementation asin practices abot sa agriculture, pero sa secondary schools, saro ini na Rodriguez" ("Rodriguez National High School is considered as one of the progressive schools in Pili District. Back when I was still a school head, we often won awards like Wins and I consider this as one of our best practices. There are secondary schools practicing good agriculture also and Rodriguez is one of them")
K2: *"Tama man si tigsabi ni Ma'am nindo ta pirmi ngani gamit ang Rodriguez sa mga pa-competition tsaka venue nin mga programs kaya sa hiling ko, tama na iyo ang iimprove nindo lalo na kadakol pang maarabot na programs na Rodriguez ang host"* ("What your PSDS said was true, Rodriguez has potential when it comes to agriculture especially that your school has always been chosen to host events of the Division Office")

Curriculum integration of agricultural literacy occurs naturally within core and applied subjects, which Young et al. (2009) notes enhances student skill development. Among 50 schools in Pili, only three secondary schools effectively integrate agriculture. While Pili District schools implement agricultural programs, Pili National High School (East District), Rodriguez National High School, and Felix E. Villamer High School (SJPNHS Annex) in Pili West stand out for their SHS offerings and agricultural resources.

K1: *"Nag offer pati kita nin Horticulture kaya kaipuhan ta talaga ma-maximize ining skill na ini para magdakol ang enrolment din"* ("The school offers Horticulture that's why we really need to maximize this skill to increase the enrolment")

E2: *"Igdi sa school mi, since puro pa sana man mga JHS ang nagigibong plots, tig-rerequire mi si mga subject teachers na mag-initiate nin mga activities na pwede makatabang mapagayon ang school"* ("Since majority of the students who have been doing their plots came from the JHS, we encourage teachers to initiate activities that can contribute to the beautification of our school")

P3: *"Kadakol sadi mga bamboos, tigsasabihan mi si mga teachers na taga-tukduan ang mga students na maximize c mga resources igdi sa*

palibot tapos ugwa din kaming sarong teacher na iyo ang nagkakapot sa poultry production ("There are plenty of bamboos in our school and I always tell my teachers to teach the students maximize their natural resources. We also have one teacher who focuses on poultry production")

Students demonstrate increased engagement through agricultural integration in classrooms, recognizing cross-disciplinary applications (Stubbs & Myers, 2016). Teachers report that incorporating agricultural examples enhances students' understanding of scientific principles across disciplines (Thompson & Balschweid, 2000), creating meaningful connections between academic concepts and real-world agricultural applications (Stubbs & Myers, 2016).

P3: *"Magayon бага na si mga eskwela iyo ang nagpapadakula nin 48 days tapos si mga sugok titiripunon asin papabakal pero syempre minsan si teacher man ang nalulugi ta sigeng abunar pero iyo na ngani an ang sinasabing para sa bata"* ("It's gratifying to watch our students grow hens and gather eggs for sale. We cannot, however, rule out the possibility that the teacher would overspend and suffer a greater loss than gain. This is what we do in turn for the children")

E2: *"Meron kami ngayon competition kung arin ang pinakamagayon na garden magkakaigwang incentives"* ("We are hosting a competition for our students, whoever has the most beautiful garden, will get an incentive.")

Integration of academic concepts can take on many forms. For example, the student may be asked to redesign a common but handy garden tool to integrate many science and math concepts while also developing welding skills.

R2: *"Mas maganda neng na nakikita ng mga eskwela natin yung nag set ba tayo ng example sa kanila. Ako ngani ta wala man masyadong space sa bahay naming, nilalagay ko dun sa mga lata lata tapos dun ako magtatanim, ittransfer ko nalang pakatapos kaya yun na mga marigoso, lahat yun ako ang nagtanim. Magandang nakikita ng mga bata yung ganon na examples para sila din mag-*

initiate na magtanim eventually ma-appreciate din nila yun" ("It is better if the teacher sets an example to the students. In our house, we have a little to no space for gardening, but I make use of recycled materials like cans and plant there. All the bitter melon I sold; those are products of my garden. Allowing students to see us initiate this kind of activities would later motivate and encourage them to appreciate agriculture more.")

Students apply academic concepts, particularly in math and science, while developing agricultural tools through welding, demonstrating how agricultural literacy integration enables practical problem-solving skills in real-world contexts.

Challenges in the Integration of Agricultural Literacy in the K-12

Perception on the Integration of Agricultural Literacy

Integration of agriculture in the SHS K-12 curriculum has garnered mixed responses regarding student readiness. While Simpson et al. (2004) note that integration shouldn't solely follow NCLB policy requirements, incorporating agricultural concepts provides essential real-world experience for holistic education.

K1: *"Napuon бага kaya yan pirmi sa mga teachers. Kung dae man inclined si teacher sa agriculture be it like gaya sa pagtatanom, si mga students dae man an mahigot na magtanim"* ("It will all start with the teacher. If the teacher is not inclined to agriculture like gardening, the students will not be motivated to plant as well.")

K2: *"Actually, kung by practice, kayang kaya man talaga ta kadakol na ang schools na nagigibo kaan, pero sa sustainability, since bako man ngani gabos inclined sa agriculture, si nabubuild na community of practice in terms of agriculture, nawawara. Jan na dapat naintevane si teacher, na masiguradong si napuunan, dae man masayang"* ("Since not everyone is interested in agriculture, the community of practice in schools is not sustained in terms of sustainability, even if

we were to strengthen agriculture through practice. The teachers need to step in here so that the school's efforts are not wasted")

K3: *"Kaya ang Division especially si mga head, nagibo nin mga activities para maencourage si schools na magparticipate. Kung dae man active ang school head, syempre pati ang mga nasasakupan nya, dae man an magiribo"* ("That's why the Division offers activities to encourage schools to participate. If the school head is inactive, of course the teachers and students will be not be participative also")

R2: *"Ugwa kitang Horticulture kaso mayo man nageenroll ta sasaro sana man ang teacher tapos hali pa sa JHS. Mayo man бага sa SHS na paratukdo talagang agriculture"* ("It's gratifying to watch our students grow hens and gather eggs for sale. We cannot, however, rule out the possibility that the teacher would overspend and suffer a greater loss than gain. This is what we do in turn for the children.")

P3: *"Aminon ta man sa dae, bako man gabos para sa agriculture. Igdi sa school mi, pipira sana itong mahihiling mong na-garden talaga. Ang agriculture pati is very broad na minsan maski ngani teacher kana, pag hinapot kang what is AGED for you? Dae ka man tulos makakasimbag."* ("It's gratifying to watch our students grow hens and gather eggs for sale. We cannot, however, rule out the possibility that the teacher would overspend and suffer a greater loss than gain. This is what we do in turn for the children.")

Teachers' perceptions of agricultural integration are shaped by their experiences (Borko & Putnam, 1996; Diisinger, 2001; Pajares, 1992). Knobloch & Martin (2002a) found that teachers who recognize agriculture's career relevance and cross-subject applications are more likely to integrate it. Their motivation increases when they see clear benefits to teaching and learning (Tschannen-Moran et al., 1998; Bandura, 1997).

E2: *"Mayo pa po masyadong activities igdi sa school mi except sa school-based na garden competition"* ("Activities in our school in terms of agriculture is limited. We only have the school-based garden competition.")

E1: *"Depende po kay ma'am kung mapagibong*

garden, nasurunod man kami." ("It depends on our teacher. If she tells us to do something, then we do it.")

R1: *"Okay man sako ma'am kaso kung si klase mi lang, parang unfair man. Maray po kaan kung dakol. Minsan pati pag napa-rabus, si iba dae man natarabang."* ("It's okay but it would be unfair if our class will be the only group to do it. It would be better if everyone is involved. There are times that students and faculty do not help during Rabus.")

P1: *"Si ma'am _____ ngani maski math ang tinutukdo, matibay mag-garden tsaka iyo po kaya talaga si napasunod samo."* ("Ma'am _____ is really good in gardening and she motivates us to do it also.")

Teacher success in agricultural integration largely depends on their subject perspectives (Pajares, 1992). Educators' willingness to implement agricultural activities facilitates effective cross-curricular integration.

K1: *"Iyo na ini ang tigsasabi ta na practice what you teach ta kung бага, dae ta man pwede itao sa mga eskwela ta ang sarong skill n akita ngani dae ta ina-apply sa sadiri ta."* ("That is where we used the quote practice what you teach because you cannot provide to students the needed skill you don't have.")

K3: *"Kapag si teacher positive, kayang kaya man talaga ini magibo"* ("All is possible if the teacher has a positive mindeset.")

R2: *"Pwede man na by citing examples gaya, GAS si estudyante, ma apply ka nin agriculture sa pagtao nin examples. Pinaka applicable kaya sya sa Science, TLE, kung Math ang subject ang itatao mong pacomputon pagsukol gaya nin plot or si length and volume gaya kan na harvest na gulay pwede man mga arog kaan."* ("We can apply it through providing examples. For an instance, the student came from GAS, provide them examples that they can relate into. It is simple to apply agriculture in subjects such as Science and TLE, in Mathematics, they can measure the length and quantify the volume of harvest or measure the plots.")

Key informants emphasize agricultural literacy's importance for holistic education, yet

its integration faces challenges due to insufficient teacher training and expertise. While school administrators and DepEd officials support agricultural literacy as essential for food security, students view it as non-essential to their chosen academic strands.

K1: *“Equip the teachers, ta kung ang problema ta mayong mga seminars and workshops, edi iyo dapat ang saro sa mga Key Priority areas kan school”* (“Equip the teachers and provide seminars/ workshops and trainings for them. This should also be included in their Key Priority Areas.”)

R2: *“Kurulang man pati sa gamit and fund para mapagayon ang implementation kaan sa school.”* (“We have limited resources and fund for the beautification and implementation of agriculture in our school.”)

P2: *“Mayo man po бага kayang budget tapos macollect sa mga studyante or minsan, kami ang magastos, syempre iba iba man ang mga pinaglalaanan mi bako man pirling para sa school.”* (“We have limited funds and most of the time, there is no budget for pursuing activities like this. We often shoulder the expenses or if not, we collect from the students however, we all have different priorities and sometimes it is not okay to overspent for school needs”)

R3: *“Pag dae man kaya part kan SIP, dae man бага natatawanan talaga nin fund”* (“If it is not in the SIP, it is impossible to get enough fund.”)

P3: *“Maherakon pati kapag si teacher na ang sigeng abunar. Nabenepisyuhan man kami kadtong nakakuha sa DA nin mga manok, kaso igwa man talaga kitang mga unforeseen na mga pangyayari halimbawa ngaya, may bagyo, tapos masasabayan pa na kulang na ang pambahog nin chicken, imagine nasa 4,000php ang nagagastos ni teacher mi para lang sa feeds kan manok, tapos si benta nya kan mga sugok hababa pa minsan, dae pa nabarayad, edi lugi lugod pero para dae mademotivate sim ga eskwela, siya si sigeng bakal.”* (“When a teacher pays for costs solely to enhance students' learning, it is heartbreaking. We receive hens from DA, but because of unforeseen issues like storms and a lack of funding for feeds, which roughly costs

4,000 PHP and is more than the earnings from the eggs she sells, she instead purchases her pupils' items to encourage them to sell more”)

Implications of Agricultural Literacy to Students

Agricultural literacy provides a strong foundation for developing 21st-century skills in SHS students. Through hands-on projects and real-world problem solving, students gain practical understanding of agriculture's importance. This experiential learning approach creates an engaging environment that fosters both skills development and appreciation for agriculture.

R2: *“Pwede man na by citing examples ngaya, GAS si estudyante, ma apply ka nin agriculture sa pagtao nin examples. Pinaka applicable kaya sya sa Science, TLE, kung Math ang subject ang itatao mong pacomputon pagsukol ngaya nin plot or si length and volume ngaya kan na harvest na gulay pwede man mga arog kaan.”* (“We can apply it through providing examples. For an instance, the student came from GAS, provide them examples that they can relate into. It is simple to apply agriculture in subjects such as Science and TLE, in Mathematics, they can measure the length and quantify the volume of harvest or measure the plots.”)

Participants were interested in evaluating agricultural literacy's impact on secondary education. Efforts should focus on helping teachers understand agricultural fundamentals and the consequences of students lacking agricultural knowledge.

K1: *“Igdi бага kaya sa indo sasaro sana man ang nag poultry and meat production tapos harabo pa kan mga students ta maisugon daa si Sir”* (“You only have one teacher to teach and promote poultry and meat productions and students do not like him.”)

K2: *“Provide them an advent to showcase their skills ta the best way to encourage the learners to appreciate agriculture, kung ugwang activities para igdi”* (“Provide them an advent to showcase their skills because the best way to encourage the learners to appreciate agriculture is thru activities.”)

P3: *“An pag adopt kan agricultural literacy*

dakulang bagay man talaga sa growth kan mga studyante. Kaso maluya pa kaya ang appreciation lalo na sa mga students sa SHS na nagenroll ngaya sa ICT ta dinudulagan ang pagtanom. Igdi samo, very active man ang mga students pagabot sa pagtatanom, pero as to pag impart kan skill n aini sa inda, mejo amay pa para masabi" ("Adopting agricultural literacy is a huge contribution to students growth however as to the appreciation of students especially in the SHS who chose to enroll in ICT to avoid agricultural-related activities, it's still too early to tell whether the skills has really been imparted to them.")

Agricultural literacy in secondary schools aims to teach agricultural principles, develop skills, and shape student attitudes through hands-on learning. While curriculum-wide integration through activities and projects enhances engagement, its impact on overall student learning has been mixed.

Strategies and Initiatives on the Implementation of Agricultural Literacy

Agricultural literacy integration in schools requires targeted strategies and curriculum support. Developing agricultural skills in SHS students promotes career opportunities, entrepreneurship, and food security at both individual and community levels (FAO, 2008; World Food Programme, 2019).

Best Practices and Community of Practice in Secondary Schools

DepEd-SDO Camarines Sur secondary schools in Pili share best practices for integrating agricultural literacy into holistic education.

K1: *"Kadacol programs ngunyan na tiggibo para masuportahan ini pero not necessary na agricultural literacy kundi holistic education through practical skills. Ang agricultural literacy, saro sana ining practice under kan holistic education na tigsusulong kan Deped"* ("There are a lot of programs and activities proposed by Deped but not necessarily about agricultural literacy rather, the division focus more on holistic education through practical application. Agricultural literacy is just one

practice under the goal of holistic education proposed by the Department of Education")

K2: *"Sa TLE, ugwa kitang maabot na technolympics na inaapod. Iyo an pag showcase kan talents kan satuyang mga TVL learners kabali na jan si crop production, poultry, agribusiness tsaka si mga output kan mga students sa Practical Research na ugwang mga innovations..."* ("We have an upcoming event spearheaded by the TLE entitled Technolympics. Showcasing of different talents from our TVL students including crop production, poultry, agribusiness, and the outputs from Practical Research subjects with innovations will be showcased there.")

R3: *"Igwa kitang PROJECT: SEED itong kay ma'am _____ about sa hydroponics gardening tapos si kay Mr _____ itong edible gardening din. Gabos an supported kan DA asin magayon na initiative kan satuyang mga teachers para matukduan ang mga students sa pag appreciate nin agriculture..."* ("We have PROJECT: SEED by Ma'am _____ which is a hydroponics garden and edible gardening by Mr. _____. All of this projects are supported by DA which is a good initiative coming from our teachers to teach students appreciate agriculture.")

P3: *"Igwang poultry production na tigoffer samo tsaka may horticulture din..."* ("Our school offers poultry production and horticulture as well.")

As education, society, and agriculture evolve, local communities play a growing role in fostering agricultural literacy (Roberts & Ball, 2009). To equip SHS students with agricultural knowledge, Pili's secondary teachers employ diverse strategies, including lectures, discussions, demonstrations, experiments, problem-solving, field trips, and digital learning.

K3: *"Kadacol paagi para ini maimplement na tultol sa schools"* ("There are many ways to implement this program properly in schools.")

E2: *"Solo man sana po kaya ako igding permanent na teacher gabos na hired sa school mi is locally funded pero nahihiling ko man na grabe ang paglapigot kan bawat saro na maprovide si needed skills kan mga*

eskwela. Maski ngani si mga JHS students, very active man magparticipate sa mga school-based activities mi” (“I am the only permanent teacher hired in this school and the rest are all locally funded and volunteers. Nevertheless, I see everyone’s efforts in providing the needed skills of the students even the JHS are very active in school-based activities.”)

P3: “Ako, I always tell my teachers itao ang kaipuhan kan mga students at teach more than the content in books.. Dae man ninda naiintindihan ngunyan, eventually pag naggurang an masabi na sana yan ay tama man palan c tigpapakigibo samo ni ma’am” (“I always tell my teachers to provide the necessary skills and knowledge to our students beyond the contents in books. They may not understand it now but eventually, sooner or later they will say ‘what our teacher said was indeed correct.”)

Teaching Agricultural Literacy using 21st Century Skills

Agriculture education should equip students with skills that support food security through effective teaching approaches. SHS students must expand their agricultural literacy to become self-reliant, resourceful, and capable of solving farming challenges. Teachers play a vital role in guiding students through complex texts, new vocabulary, and disciplinary literacy (Fang, 2006; Pearson et al., 2010; Shanahan & Shanahan, 2008). School garden projects offer hands-on learning, fostering healthier eating habits, teamwork, and environmental appreciation while reconnecting students with nature (Amiri et al., 2021; Bucklin-Sporer & Pringle, 2010; Osborne & Collins, 2010).

P1: “Personally po, mas naiintindihan ko si tigsasabi samo kapag natarao nan in examples” (“I personally understand the discussion through examples provided by the teacher.”)

R1: “Maski maisog po si Ma’am _____ mas naiintindihan ko sim ga papagibo nya sa Science kapag na hands-on na kami. Tsaka na effort po pati sa pagdiscuss. Sa iya ngani po si ugwang pinaka magayon na room ta kadakol

masetas sa luwas tapos namemaintain nya man pirmi pati kan advisory class nya” (“I really appreciate Ma’am _____ though she’s strict, I really appreciate her hands-on discussion in Science and her efforts in class discussion. She also has the most beautiful room inside the campus because of the plants she grows and is also properly maintained by her advisory class also”)

E1: “Naggabi-gabi man po kami igdi tapos pag dakol ng bungga, tinatawan kami nila ma’am para ugwa man kami maiuli” (“We also grow plants here inside the school and during harvest time, our teacher shares with us the fruits of our labor.”)

P1: “Kada aga, ugwa na pong in-charge samo na iyo ang mabubo kan tinanom. Kapag harahalawig ang bakasyon or suspended ang klase, si Sir _____ nahapit muna nin school para ayuson si mga masetas” (“Every morning, assigned students will be the one to water the plants. During class suspension or vacations, Sir _____ would always drop by our classroom to fix and water the plants.”)

Integrating academic learning with real-world contexts like agriculture enhances students’ understanding and engagement (Stubbs & Myers, 2016). In agricultural education, hands-on projects help students apply knowledge in meaningful ways (Blum, 1996). Thoughtful integration makes skills relevant, preparing SHS graduates with essential 21st-century competencies (Stone, 2011; NRC, 2011a). The National Research Council (2011b) emphasizes that non-cognitive and 21st-century skills drive employment more than formal education. Applying and communicating knowledge is valued over specialized expertise, making problem-solving and critical thinking more intuitive and transferable (NRC, 2011a).

Strengthening Agricultural Literacy through Project: RELISH

The Division of Camarines Sur aims to provide holistic education by promoting agricultural literacy through various programs. To support this, PROJECT: RELISH will be piloted at Rodriguez National High School before potential adoption in other Pili schools. With 40,000 square

meters of fertile land, Rodriguez NHS has strong agricultural potential.

R3: *“Very good ining activity na tig-propose nindo ta igdi бага sato kadakol gabi na nagtutubo jan sa may Annex ugwa, pati бага harani sa room ni Ma’am _____ tapos sa likod kan Grade 7, maray an na mapagayon ta since dakol man sana c tubo na, imaximize ta na lugod. Ihalo pa nindo an sa proposal ni Mr. _____ para mapagayon nindo jan sa Annex”* (“This is a good initiative coming from your group because we have an abundant supply of Taro plant in our school. You can even find it near the Annex building, we also have near the room of Ma’am _____ and at the back of the Grade 7 building. You can also tap into Mr. _____ to beautify the Annex building”)

K1: *“Ay ang Rodriguez бага saro sa mga progressive schools igdi sa Pili. Kadto ngani pirmi bagang nanggagana ang school ta sa mga contest, sa Wins mga arog kayan kaya saro in isa mga Best practices ta. Ugwa man na ibang schools na very good ang implementation asin practices abot sa agriculture, pero sa secondary schools, saro ini na Rodriguez...”* (“Rodriguez National High School is considered as one of the progressive schools in Pili District. Back when I was still a school head, we often won awards like Wins and I consider this as one of our best practices. There are secondary schools practicing good agriculture also and Rodriguez is one of them”)

K2: *“Tama man si tigsabi ni Ma’am nindo ta pirmi ngani gamit ang Rodriguez sa mga pa-competition tsaka venue nin mga programs kaya sa hiling ko, tama na iyo ang iimprove nindo lalo na kadakol pang maarabot na programs na Rodriguez ang host”* (“What your PSDS said was true, Rodriguez has potential when it comes to agriculture especially that your school has always been chosen to host events of the Division Office”)

K3: *“Kadakol na potentials sa Rodriguez and ang location pati nindo is very strategic kaya iyo pirmi ang napipiling host school kapag may meeting/ conference and mga pa event ang division. Tama sana na iimprove nindo pa*

an, pagayunon para every time may mavisit sa indo masabing, magayunon man ang mga projects igdi sa school nindo” (“There are a lot of potentials in Rodriguez and since your school’s location is very strategic, the Division always tap on your school to host events, meetings and conferences of the Division. It is good that you improve and beautify your school so that every time there are visitors, they would complement how good the projects in this school”)

Taro has higher nutritional value than most root and tuber crops, providing phosphorus, potassium, calcium, iron, and high-quality protein. It is primarily grown for its corm and is easy to cultivate year-round. The abundance of taro at Rodriguez NHS presents an opportunity for further research and development.

PROJECT: RELISH (Reinventing Edible Landscaping in Secondary High Schools) is a flagship initiative in Pili District aimed at strengthening edible landscaping and promoting agricultural literacy. It includes activities integrating agriculture into the curriculum, along with training and workshops on Taro (Natong) gardening. With RNHS’s fertile, unused land, the project seeks to maximize its agricultural potential.

Integrative Framework for Agricultural Literacy Integration: In practice

Based on the collected responses from the interview, the researchers have finally developed an integrative framework that can be used by the Division of Camarines Sur specifically Rodriguez National High School as they do not have existing frameworks on the integration of agricultural literacy.

K1: *“Magayon ining study nindo para ma-put into practice kung бага and ma formalize si gusto nindong agricultural literacy.”* (“Your study is good so that you may put into practice and formalize the integration of agricultural literacy in schools”)

R3: *“Since na adopt naman talaga mayo lang kitang framework na ginagamit ta sa school ta ang norm magibon in activity proposal approved by the division office bago magimplement.”* (“We have been practicing this however we do not have a concrete framework because

it has been the norm in our school to create activity proposals approved by the division office before the implementation”)

The curriculum's specific goals guide teachers in enhancing the K-12 SHS framework through integration (Figure 1). This approach addresses challenges in promoting agricultural literacy and ensures effective implementation based on key considerations.

Integrating agriculture into the SHS curriculum fosters appreciation and best practices while linking subjects through real-world applications. As education, society, and agriculture evolve, local communities play a vital role in advancing agricultural literacy (Roberts & Ball, 2009).

as PROJECT: RELISH (Reinventing Edible Landscaping In Secondary High schools) which aims to strengthen agricultural literacy among students. The program will be pioneered by Rodriguez National High School and will later be adopted by other secondary schools along Pili. The need to create strong linkage with possible potential stakeholders is also important to ensure the sustainability of agricultural literacy.

RECOMMENDATIONS

The following recommendations were drawn as a result of this study:

Enhance Classroom Instruction: Integrate examples of real-life approaches relative to

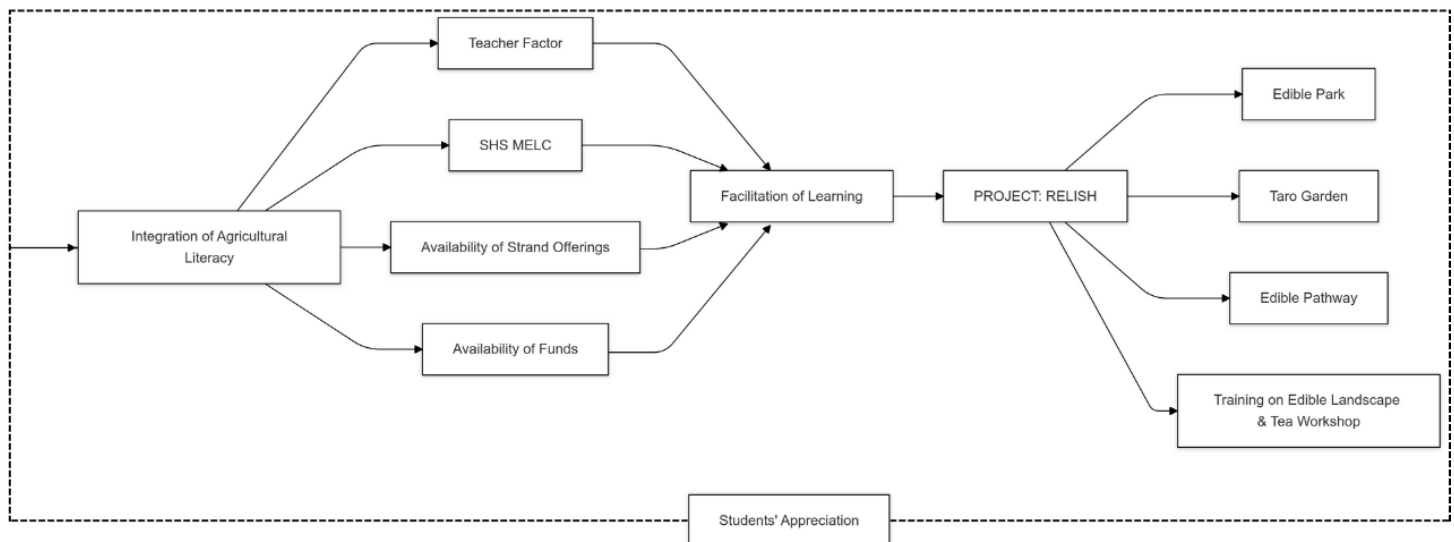


Figure 1. Schematic Presentation of Integrative Framework on Agricultural Literacy Integration based on the collected responses from the Key Informants

CONCLUSION

Agricultural literacy is a necessity in achieving holistic education and imparting students' appreciation towards becoming an agricultural literate citizen. In this direction, promoting a community of practice in schools towards achieving agricultural literacy integration in the curriculum, the researchers created a Memorandum of Understanding on the possible partnership between Rodriguez National High School and Deloverges Agri Farm to fortify the edible gardening and reinvent edible landscaping in schools. This flagship project is now named

agriculture. Involving students in agriculture from a young age through an integrated educational approach can help cultivate a generation that values and understands the importance of agriculture in society.

Increase Hands-On Experience: Create school gardens or mini farms where students can learn through direct involvement in growing food. This practical experience may deepen the understanding of students in agriculture.

Increase Stakeholder Engagement: Future researchers may involve local farmers, agricultural businesses, and community members in educational initiatives to bring

practical insights and support to the program. Thus, may suggest developing programs that may connect schools with local farmers, allowing students access to fresh produce and an understanding of local agriculture economies.

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ETHICAL APPROVAL

Consent was obtained prior to inclusion and for audiotaping of interviewees' responses. Ethical approval containing the participants' approval on the conduct of the study with their full knowledge and consent to use all data gathered for educational purposes only was presented prior to the conduct of the study. Thus, the approved conduct of the study was provided.

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