

RESEARCH ARTICLE

## Development of a home-based COVID-19 curriculum for Filipino children

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### ABSTRACT

**Background:** COVID-19 caused educational institutions to transition online, necessitating tailored interventions in spreading factual information. Formal learning in the Philippines has yet to resume physically.

**Objectives:** This methodological and formative research sought to develop a contextualized, home-based, and age-appropriate COVID-19 prevention curriculum for Filipinos within ages 5-8, 9-12, and 13-16. This article describes the process of co-developing the curriculum and identifying key themes in curriculum development which may be relevant to low-middle income countries (LMIC).

**Methodology:** Preliminary curriculum materials were developed based on COVID-19 prevention literature and existing health promotion materials. A focus group discussion (FGD) with eight subject experts was conducted to explore the barriers and facilitators to knowledge and behavioral change. Results were analyzed thematically using predetermined themes: content, structure, delivery, and appropriateness to context.

**Results:** The co-development provided insights through academic, professional, and cultural lenses. Sub-themes were generated from content, delivery, structure, and appropriateness to context recommending the use of activities that are engaging and empowering to the child and providing support for carers. Curriculum key outcomes of this research include a clearer, comprehensive, accurate, and contextualized curriculum in relation to the target age groups.

**Conclusion:** Curriculum co-development may be improved by involving key persons in the community. To promote behavioral change and hygienic practices among Filipino children, active, constructive, and interactive learning methods, as well as a motivational approach, must be employed. Major findings for curriculum effectiveness highlighted the importance of the following: prevention-focused materials, accurate and updated information, summary provisions at the curriculum's end, availability of activity materials, household involvement, and open-ended activities. Future research may work on contextualizing other health literacy curricula to the local context and tailoring interventions at the community level.

**Keywords:** COVID-19, curriculum, hygiene, home-based learning, handwashing, children, contextualized learning

## Introduction

In March 2020, after the World Health Organization declared COVID-19 a pandemic, the Philippines implemented nationwide lockdowns, followed by school closures. It is estimated that 28 million Filipino learners were affected by the sudden closure of schools due to the pandemic [1]. While the Department of Education (DepEd) was able to respond to this through the Basic Education - Learning Continuity Plan (BE-LCP)

which allows for distance-learning through various modalities [2], such policies posed significant challenges to health promotion among children in the Philippines, as programs such as the Enhanced Health Care Program (EHCP) and Oplan Kalusugan sa DepEd (OK sa DepEd) are done on-site, with teacher supervision [3,4]. As classes have shifted online indefinitely, there is an urgent need for home-based health promotion curricula, particularly addressing the pandemic.

Home-based curricula have been used over the years for various reasons. LaRowe *et al.* developed a home-based nutrition education curriculum for American Indian (AI) families to address childhood overweight and obesity rates in AI communities [5], while Van Tuijl *et al.* developed a home-based early intervention curriculum for children at risk of educational failure [6]. Both curricula included different lessons and activities related to the topic of interest that were taught by the child's carers at home. The former found that families who received the curriculum were enthusiastic about the curriculum developed, while the latter found modest improvements in the cognitive development and emergent numeracy of Turkish immigrant families implementing the curriculum.

In the Philippines, a study about the development of a supplementary COVID-19 curriculum for kindergarten children defined a curriculum as “a set of intended learning outcomes that include standards and competencies that will guide young children in learning” [7]. Building upon this definition, this study defined a home-based health promotion curriculum as a set of lessons and activities about COVID-19 and proper hygiene taught by the child's guardian at home.

Interactive styles of learning through songs, games, and storybooks have been effective for health promotion among children. Hygiene Heroes (HH), a project dedicated to improving children's literacy on preventative health, has been used in previously developed curricula for various countries [8,9]. The advocacy of the project centers on teaching a few lessons and using many activities to build and reinforce healthy habits. In adopting the existing COVID-19 curriculum for the Philippines, contextualizing to the local setting is needed. The socio-ecological approach to health promotion emphasizes that the design of health promotion interventions must consider the carer's and children's biological, behavioral, sociocultural needs, and environmental and economic resources which may influence the effectiveness of the said interventions [10]. This is the basis for the co-development process we used in creating a COVID-19 curriculum for Filipino children.

## Objectives

This methodological and formative research describes the curriculum co-development process, explores factors hindering and promoting knowledge and behavioral change on COVID-19 and hygienic practices among Filipino children, and identifies key themes relevant to effective curriculum structure, content, and delivery methods for each age group.

The curriculum aims to improve the children's literacy on COVID-19 as well as the habits and hygienic practices related

to preventing the transmission of the disease. Since the formative process of this study (see Figure 1) does not include the implementation of the curriculum, an assessment criterion to determine the achievement of these outcomes has not been specifically identified nor implemented yet.

## Methodology

Aiming to teach hygiene through behavioral change, HH has dedicated efforts to teach preventative health in the US, India, Africa, and Philippines, especially within underprivileged regions. HH is a project of the University of California, Berkeley started by Professor David I. Levine in 2014.

Mid-2021, the Philippine team was in its second year of operation while Philippine schools experience on-site class disruptions due to COVID-19. As such, the team has focused on contextualizing the US version of the HH COVID-19 curriculum and assessing its applicability to Filipino children through needs assessment. This allowed the team to develop a preliminary curriculum for three age groups (5-8, 9-12, and 13-16) which covers what COVID-19 is, its biology, transmission, and prevention. The content and organization of topics in each curriculum retain much of the US version which utilized guidelines by health institutions such as the Centers for Disease Control and Prevention, adopted materials from previous HH “handwashing” and “cold & flu” curricula, and reviewed existing respiratory disease-related materials on digital platforms.

Each curriculum was curated in consideration of the age bracket's learning abilities (see Table 1 for materials used, duration of use) with all materials made available in digital and print (partially-colored), as well as English and Filipino versions.

Materials for 5–8-year-olds comprised 61 vivid pages. The activities included in the manual were: role-playing, storytelling, arts and crafts, sensory play, and an experiment.

It included a storybook “Hey, it's RONA!” (“Ako si RONA”) about child superheroes fighting a supervillain virus named RONA.

Materials for 9–12-year-olds were 46 pages of facts and activities. Activities included word search, word scramble, crossword, and a soap and water experiment. It also had an interactive story activity and a habit tracker (see Figure 2).

For 13–16-year-olds, 60 pages of facts and activities were included like: reflection on COVID-19 concepts,

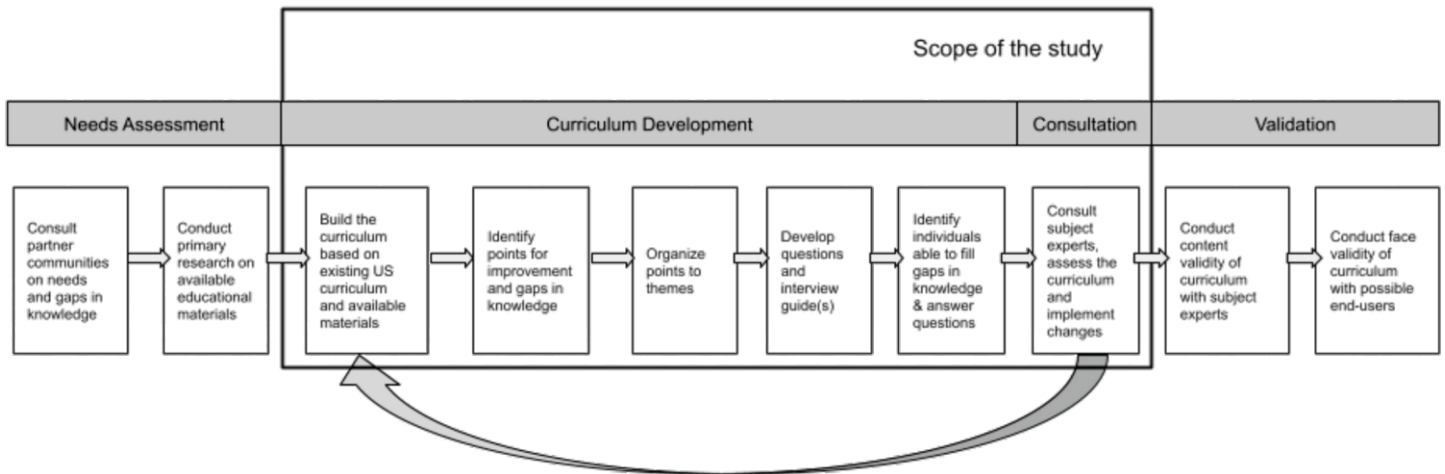


Figure 1. Scope of the Study

Table 1. Key Characteristics of Each Curriculum

Age Group	5-8-Year-Olds	9-12-Year-Olds	13-16-Year-Olds
<b>Materials</b>	Storybooks Diagrams Activities Videos	Diagrams Interactive story Puzzles Habit Tracker	Think & Reflect Visual Puzzles Dance Habit Tracker
<b>Duration of Use</b>	N/A	A suggested timeline of 5 days was included in the curriculum.  Duration of learning time was recommended for 10-30 minutes, while activities took only 5-20 minutes.	A suggested timeline of 5 days was included in the curriculum.  Duration of learning time was recommended for 15-30 minutes, while only the habit tracker was given a suggested duration of 5 minutes daily.



Figure 2. Prototype Habit Tracker (ages 9-12)



Figure 3. Prototype Materials (ages 13-16)

protocol identification, Mandala habit tracker, and bingo and crossword activities. Videos of proper handwashing (see Figure 3), dance, and “dabbing” when one coughs were also attached.

Throughout the development process of this preliminary curriculum (see Figure 1), Professor Levine and interns in the US and India teams provided feedback on restructuring the curriculum and improving delivery. The entire process allowed the team to observe the lack of existing home-based health educational materials for children and allowed them to note gaps on methods for effective and age-focused learning. Points for improvement were organized into four themes (content, delivery, structure, and appropriateness to context), and questions on how to address them were formulated. Afterward, the team identified subject experts who may have the capability to fill the gaps in knowledge and give feedback on how to ensure the usefulness of the material to children.

Our team then invited subject experts to a focus group discussion (FGD) to co-develop this preliminary curriculum. Eight experts attended with at least one from the following fields:

1. General Pediatrics
2. Developmental Pediatrics
3. Childhood Education
4. Developmental Psychology
5. Community Medicine
6. Sociology and Anthropology
7. Public Health and Health Promotion

The preliminary curriculum and FGD discussion questions were forwarded 2-3 days prior to the FGD for reviewing. The experts were encouraged to read through the materials to provide constructive feedback on the curriculum’s content, structure, delivery, and appropriateness to context.

Given the transition to online learning and campus closure, the researchers held the FGD online via Zoom on November 30, 2020 lasting approximately three hours. It began with a brief overview of curriculum materials, followed by a discussion covering predetermined themes: content, structure, delivery, and appropriateness to context. As the invited subject experts from diverse fields provided recurring comments, data saturation was perceived to be achieved. The transcribed discussion was then analyzed thematically using the four themes.

### Thematic Analysis

Two pairs of coders (CAK, GLM, and JPM, DNS) read the whole transcript twice and engaged actively for every reading run. Initial ideas and meanings from all respondents were annotated to identify potential themes. The main coding process used descriptive codes, preserving the meaning expressed by the eight (8) subject experts who joined the focus group. The coders assigned pseudonyms written as "SE [number]" to all the participants.

To code descriptively and inductively, the coders assigned context-specific and salient codes to utterances in the transcript. The pairs of coders constantly compared codes for similarities and differences and reworded and combined codes that share the same meaning. Unrelated codes were maintained as distinct codes. The coders then deductively categorized these codes (as sub-themes) under the themes “content,” “delivery,” “appropriate to context,” and “structure” which were pre-determined during earlier consultations with Prof. Levine and other HH country teams. The sub-themes were generated according to a common meaning displayed by the codes in the same group, and according to the discretion of the coders. The study, therefore, used a dualistic method of inductive and deductive thematic analysis [11]. In the results



**Figure 4.** Revised Materials (ages 9-12)

section that follows, relevant quotes are presented (indented and quoted) where they apply to support and reinforce the generated themes and sub-themes. The findings from this study have since been used to revise the drafted curriculum.

To aid the revision of the curriculum, a modified SCAMPER ideation technique was used to organize the findings into actionable points for the revision of the curriculum. This entailed the organization of themes and sub-themes in terms of “Substitute,” “Combine,” “Adopt,” “Modify,” “Put to Another Use/User,” or “Eliminate.” As “R-Reverse” was deemed not applicable, the tool was tweaked to SCAMPE. This process of reorganization to the SCAMPE framework is no longer part of the scope of this study, and will therefore not be discussed in detail.

## Results

Developing and validating contextually appropriate COVID-19 prevention curriculum for Filipino children requires exploring environmental, social, cultural, economic, and other factors. These factors enumerated in the study objectives were observed to cut across several subthemes (see Figure 6). Under the theme “delivery,” the sub-themes “family and household involvement,” “parental support,” “children as instruments of change,” and “framing information using a positive approach” are observed to embody the social factors that facilitate knowledge and behavioral change in children. Under the theme “feasibility” and “appropriateness to

context,” the subthemes “consulting local leaders,” “contextualizing terms,” “concepts and understanding health,” and “encouraging hygiene in areas that are COVID-19-free” serve as environmental and cultural factors that either facilitate or impede behavioral change among children.

In identifying the appropriate curriculum structure, content, and delivery, FGD questions were framed to elicit feedback that reflects several sub-themes. Qualitative data under content identified addressing learning and behavioral change deficits by adding focus on maintenance of good health, adopting related materials, including knowledge on prevention and transmission, making the information uniform, and updated across all brackets, mitigating any tension from curriculum use, and expanding the scope of future curricula. In structure, data identified cohesiveness and buildup of material through brackets, summary, and availability of materials. Finally, the data identified that additional open-ended activities and clarity and conciseness of the material improve the delivery of information. Most comments were classified under Content, while others fell under Delivery, Appropriateness to Context, and Structure, in a decreasing number of entries. The data identified in each theme were reviewed as sub-themes to identify the priority suggestions as seen below.

### *Theme 1: Content*

This refers to the concepts included in accuracy, completeness, consistency, and scope.



Figure 5. Prototype Materials (ages 13-16)

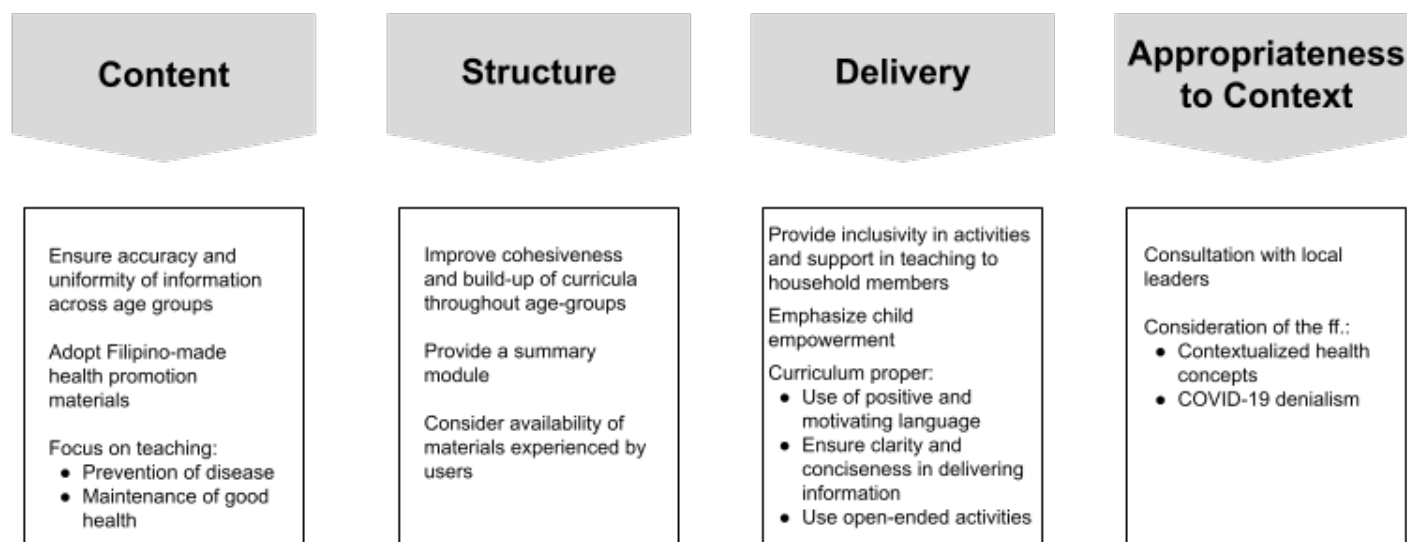


Figure 6. Summary of Results

*Sub-theme 1: Concentrate on prevention vs. transmission.*

Discussing handwashing for disease prevention may be more effective for knowledge and behavioral change rather than focusing solely on disease transmission.

“Although we have parts on transmission, maybe focus on prevention...maybe say that all of us are superheroes when we wash our hands” (SE 4)

*Sub-theme 2: Emphasize the importance of maintaining good health.*

COVID-19 prevention should include topics that encourage children to take care of their health during the pandemic.

“...aside from COVID-19, the issue [is] proper diet... nutrition...physical activity, maraming patients in the clinic now medyo tumataas na 'yung weight [there are a lot of patients in the clinic now who are gaining weight].” (SE 5)

*Sub-theme 3: Ensure the uniformity of information.*

Information (i.e., story characters named Rona in Filipino versions and Cory in its corresponding English versions) should be consistent throughout the age brackets to facilitate learning continuity.

“...your information [should be] consistent [in] all three [versions of the curriculum] ...[so] regardless of whether they are in the same household, the messages they are getting are correct.” (SE 8)

*Sub-theme 4: Keep the content accurate and up to date.*

Considering that health authorities revise policies around COVID-19 based on emerging evidence, it must be ensured that all information is correct and up to date.

“For [physical] distancing, are we sticking to 2-meters? Because that's not the standard, the standard is 1-meter only.” (SE 8)

**Table 2.** Implications of the Identified Themes and Sub-themes on the COVID-19 Curriculum Mapped in SC Framework.

	Content	Structure	Delivery	Feasibility and Appropriateness to Context
<b>Substitute</b>	<p>Make sure that information (i.e. names of story characters) is consistent throughout the brackets.</p> <p>[For example, storybooks that discuss coronavirus in the frame of heroes and villains were created in both English and Filipino versions. The name of the superhero and the virus should be the same for consistency (i.e., the virus should only use the name Cory or Rona).]</p>	<p>Keep in mind the learning characteristic of the age group when deciding the activities used for each bracket. This may add to the cohesiveness of the curriculum in a way that there is a greater distinction placed on the children's level of learning.</p> <p>[For example, children at different ages may find visual or textual activities more conducive for learning.]</p>		
	<p>Make sure that all materials are clear and concise, and that all information is correct and up to date.</p> <p>[For example, the curricula indicated physical distancing to follow 2 meters. Recent directives from the government have set 1 meter as the standard.]</p>			
<b>Combine</b>	<p>Addressing misconceptions about vaccines and antibiotics to clarify how these should be used against COVID-19. This would also help to clarify the proper usage, benefits, and stigma associated with COVID-19 vaccination, and vaccination in general.</p>	<p>Include more activities that encourage children to express their creativity.</p> <p>[For example, dance activities may be included for all brackets.]</p>	<p>Combine different media to make the curriculum one big interactive story.</p> <p>Encourage children to apply and share what they have learned with their peers and community.</p> <p>[For example, allow them to remind others about hygiene practices. Moreover, indulge them as they try to involve family members in the activities recommended by the curriculum.]</p>	<p>Supplement all materials with Filipino translation.</p>
<b>Adopt</b>	<p>Explore more topics that should be learned by school-aged children, possibly health [concerns] from a more social/anthropological perspective</p> <p>“How they should go about social interactions as well. Answering questions like ... if [I see] my Lola and Lola can I hug them, can I kiss them? I miss my friends...how can I maintain social interactions, without [physically] seeing each other?”</p>	<p>Make the materials clear and concise; too much information is not needed as this may overwhelm both parents and children. Remember that it is not necessary to explain COVID-19 at the molecular level.</p>	<p>Consider the materials available in the immediate environment of the children.</p> <p>[For example, water may be difficult to acquire for those living far from bodies of water and/or water stations. Aside from that, paper might be a scarce and expensive resource which could be replaced with grass clippings.]</p>	<p>Consider local and indigenous perceptions and insights for contextualized application.</p>
	<p>Introduce open-ended questions that will stimulate reflection about the pandemic. Frame the curriculum as a project or activity the entire family can engage in.</p> <p>[For example, the “What's Wrong in the Picture” game could include prompts about why individuals are unable to have access to face masks and shields.]</p>	<p>Be flexible in the manner of disseminating materials. For example, have print versions of the materials for those who do not have access to the internet or other devices.</p>	<p>Support the involvement of parents by providing them a guide on how to respond to their children's questions about the lesson. They may be provided by a Frequently Asked Questions or FAQ which includes that they are encouraged to admit “I don't know” if they are unaware of the correct answer.</p>	
	<p>Check out related materials that can be adapted (e.g. AHA! Learning Center's COVID-19 module with DOH).</p>	<p>Add open-ended activities throughout the curriculum. These will help encourage reflection and application of what the child has learned.</p>		

**Table 2. Implications of the Identified Themes and Sub-themes on the COVID-19 Curriculum Mapped in SC Framework.**

	Content	Structure	Delivery	Feasibility and Appropriateness to Context
<b>Modify</b>	Include topics that encourage children to take care of their health during the pandemic. These could include proper diet, nutrition, and rest, among others. An effect of this could be added to focus on the maintenance of good health.	Strategize on how to connect the different brackets to make a cohesive curriculum. Place activities with varying difficulties according to the age brackets' educational background	Increase the opportunities for family involvement in the manner the curricula are delivered. This could be done by way of activities that the family can do as a whole for all members to engage in positive behavioral change.	Break down or simplify terms further to make them easier to understand (e.g., words such as pneumonia may not be grasped immediately).
	Frame the activities in the light of prevention vs. transmission. This is to stress the importance of handwashing as a preventive strategy rather than discussing the mechanics of disease transmission.	Frame the information using a positive approach to empower children instead of making them fear the disease.		Identify local professionals and officials from whom children and parents can seek advice, and with whom curriculum materials can be co-designed with.
	Ensure that there is a “build-up” throughout the level of difficulty and comprehensiveness of information to match the cognitive ability of users.	Emphasize motivation constantly to help the children understand and appreciate what they are learning. Remind them of the rationale behind the lessons.		Place greater emphasis on hygiene knowledge and practices when deploying the curriculum in areas that are COVID-19-free.
	Consider the integration of the spread of fake news or how to tell if a source of information on hygiene/COVID-19.			
<b>Put to Another Use/User</b>	Provide alternatives or contingencies if the child does not want to participate.  [For example, provide a pen and paper activity like slogan making if the child is not comfortable doing more active activities like dancing.]	Include a summary for all materials to help recenter the users on the long-lasting learning and behavior the curricula wishes to impart.  [For example, supply all bracket materials with learning objectives/ assessments and a summary page. Anything that would give the children some signs for a call to action.]	Enable the child to set an example and remind others about hygiene practices.	Consider the other learners and facilitators of learning in the household.  [Note that the content of the curriculum is relevant to people young and old. Other relatives, housemates, or community members may learn about hygiene and health habits, especially those related to COVID-19 from the material.]
				Consider the stage and/or severity of COVID-19 transmission in various areas, and how the reception might vary.
				Consider the presence of COVID-19 denialism and how it may potentially affect the reception of the curriculum in households.
<b>Eliminate</b>	Present the content using a positive tone so that children are empowered, rather than just fear the disease.			

*Sub-theme 5: Adopt related materials.*

The experts recommended that related materials may be used as a reference to improve curriculum content.

“Have you seen the AHA learning center [non-profit organization providing educational materials for Filipino children]?...It might be interesting to see how they talk about COVID and [how they communicate] in Tagalog, as well.” (SE 8)

“[You can] look more into project-based learning if you want to incorporate that...” (SE 7)

*Sub-theme 6: Provide contingencies for conflict/tension resulting from curriculum use.*

Using the curriculum at home may create conflict between the child and the carer. It is important to provide contingencies if the child does not want to participate in the activities.

“...just imagine what if the child doesn't do it... I don't want it to be a source of tension...[provide] some tips for the parents, just weaving-in the idea [that] they're not supposed to be in trouble...” (SE 7)



*Sub-theme 7: Expand the range of future curricula.*

Experts suggested that other timely and relevant topics appropriate for school-aged children such as health from a social/anthropological perspective, antibiotics, and vaccination be added in future curricula.

“...and very discriminate use of antibiotics for mild illness. Remember the COVID illness is easily confused with other infections...that the moment kids are sick, they are right away medicated.” (SE 1)

*Theme 2: Structure*

This refers to the age brackets division and the strategies' appropriateness in enforcing effective learning for each age group. It includes the approaches and supplementary materials utilized for better information retention, learning, and behavioral change.

*Sub-theme 1: Cohesiveness and build-up of material throughout brackets.*

To keep the learner engaged, the activities must match the child's level of development. The level of difficulty of the materials should build up as age increases.

“If it's [for] hygiene purposes, the educational materials can grow with the child. The starting storybook [can be] simple and then it can grow.” (SE 5)

“...if you want the whole project to be more cohesive, you [include] dance for all brackets...You can have one puzzle, one dance and one story nagbi-build up, medyo tumatanda yung activities [activities progress as the child gets older].” (SE 5)

*Sub-theme 2: Summary module.*

To synthesize learning, a lesson summary and concepts should be included at the end.

“There's no build up in the materials; it seems like there's a lot of information there...I don't know how it all ties together or how it ends; it would be good to see a...summary at the end.” (SE 8)

“...we [are communicating that]...if we do these hygiene practices,...we can beat...COVID. In the end [what is the] resolution if we do these?...So if we do, our hygiene [and] our habits, [for example], then [that is] equal to a healthy community...We want the consequences after we do these habit-forming activities.” (SE 5)

*Sub-theme 3: Availability of materials.*

To ensure the feasibility of the curriculum, the materials available in the children's immediate environment should be considered based on their context. Using materials that

are commonly available in various contexts, even resource-limited ones improve feasibility.

“...agricultural kasi dito [because it's agricultural here] and a lot of what they have, siguro rice hulls [maybe rice hulls]. Like instead of glitters, kasi nagbabayo sila ng palay diba? [because one of their main activities is threshing rice, right?].” (SE 3)

*Theme 3: Delivery*

Delivery refers to media and methods the children learn from. Delivery dimensions include the venue (home/school), facilitator (parent/students), and activity setup (individual/by group). It is also concerned with the teaching modality used, specifically the language (Filipino/English) and the instruction medium (written/oral/video).

*Sub-theme 1: Family and household involvement.*

The curriculum can include activities done as a family to involve the whole household in behavioral change.

“...framing this as a family project in learning more about COVID, like how we can prevent or protect our own family and health, and ways we can help [the] community.” (SE 7)

“Who is in the household? It's not limited to the traditional nuclear family, you can have an expanded family...the learning of the child is not limited to parents.” (SE 6)

*Sub-theme 2: Parental support.*

Providing a guide would aid parents in answering questions their children might ask them while using the curriculum.

“More guides for parents, maybe like an FAQ [Frequently Asked Questions]. One of the [difficult] things as a parent is tanungin ka wala kang masasagot [one of the [difficult] things as a parent is when your child asks you something and you cannot give an answer].” (SE 7)

*Sub-theme 3: Child as an instrument of change in the community.*

The curriculum can empower the children to set an example, and encourage them to apply and share what they have learned with their community.

“You can use the children to police the parents or household; or if you want a bigger objective: teaching them, kasi sobrang konti lang ng stuff how it affects older people. [there are only a few, often limited knowledge on how certain practices affect older people]” (SE 8)

“For adolescents, it's nice if you can engage their peers or the community. If you can encourage activities or fiddle projects

that they can share on social media. So that their friends can see it or they can share it with the community.” (SE 7)

*Sub-theme 4: Using open-ended activities.*

The curriculum would be more effective and engaging by including activities that encourage children to reflect and apply what they have learned.

“...elicit possibilities with them. Ask them open-ended questions, let them think, reflect, and come up with ideas.” (SE 7)

*Sub-theme 5: Clarity and conciseness.*

The materials must be clear to avoid overwhelming users. The information must be streamlined and communicated through the best possible medium.

“...go back to the core and start from basics, cause if not, you're just overwhelming users.” (SE 8)

“...there are more videos on YouTube that are simpler... I watched the video [and] it's very... highfalutin [terms like cilia, pathogens, etc.]. It's too much information [even for]... five to eight year olds...since we are visual learners, I think there are more videos [that are not] text heavy.” (SE 2)

“A way of communicating and sharing stories is through dance...Anywhere and [in] any barangay [town], people dance. So you need to find that thing in the community, what's the ubiquitous thing and how do they share stories?” (SE 3)

*Sub-theme 6: Framing the information using a positive approach.*

It is important to empower children by framing content positively, rather than making them fear the disease.

“...the general atmosphere of the story it's very scary...it's so threatening. Especially at this age they can become overly praning [concerned]...I was thinking of going on a more positive note.” (SE 4)

*Sub-theme 7: Emphasizing motivation.*

The curriculum must communicate the value of following the lessons and remind the children why they have to change their behavior.

“...you cannot throw information at people and expect them to do the behavior that you're asking; people are interactional. What is that motivation around it?” (SE 8)

“...it has to be clear why they're doing it...what's the clear motivation and encouragement to do so.” (SE 8)

*Theme 4: Feasibility and Appropriateness to Context*

This theme refers to curriculum applicability and relevance to the local context, environments, and needs of each household. The experts emphasized the large heterogeneity within the Philippines.

*Sub-theme 1: Consulting local leaders.*

It would be helpful to identify local professionals and officials with whom curriculum materials can be co-designed with for future revisions. They can be indicated in the curriculum as people from whom children can seek advice should they have thoughts and questions.

“...just give [the children and their family] an idea who [they] should connect [with]. Maybe you can talk to your barangay, or maybe talk to the doctor in the health center...” (SE 7)

*Sub-theme 2: Contextualizing terms, concepts, and understanding of health*

Medical jargon and complex concepts (i.e. Germ Theory) should be made more understandable to improve acceptance and effectiveness. Curriculum activities can also be made appropriate and engaging according to the local context.

“For T'Boli, [one of the indigenous peoples of South Cotabato in Southern Mindanao], dust is their version of Germ Theory; they have to do rituals to get rid of the illness; they don't view it as microorganisms [...]. If you can't see it, it doesn't make sense.” (SE 3)

“Getting the terms that are translated into the different communities [where] these educational materials would be used ... capture the local terms in different areas where this will be applied...say, pneumonia, do they have [a] local [term for it?]” (SE 6)

“T'boli people love to dance... that's their way of telling stories...what they do is some kind of mimesis.” (SE 3)

“...they would even know their community context a lot and know what are possible things and action points...[that are] relevant and meaningful to their community...not prescribing what they should do...I mean sila rin makakaalam if like madumi ba 'yung tubig [they would be the one to know if the water is dirty].” (SE 7)

*Sub-theme 3: Encouraging hygiene in areas that are COVID-19-free.*

It is important to consider the COVID-19 transmission stage and/or severity in various areas, and how the reception of the curriculum could vary as a result. The message of the

curriculum should be made relevant for areas in the country that experience low transmission, and do not view COVID-19 as a significant health threat.

“[consider] how you want to implement this especially in the initial stages because basically marami na ring parts [there are several parts] of the Philippines that are COVID-free...so for them ibig sabihin ba ng [does that mean that] COVID equals mask or COVID equals hand-washing. We want them to focus really more on the hygienic practices with, or without COVID.” (SE 5)

#### *Sub-theme 4: COVID-19 denialism.*

COVID-19 denialism is a relevant issue in the country, and the curriculum can include modules to address this topical issue.

“[Some believe that] COVID is not real...all you need to do is buy this air purifier that you can wear around your neck... COVID fatigue... COVID wasn't a big deal, no one died.” (SE 3)

#### ***Implications on the COVID-19 curriculum and other future curricula***

The co-development with subject experts emphasized age-appropriate activities for learning science-based concepts, considering individuals develop at a unique pace. Descriptions of the development level suitable to each age bracket were added to guide stakeholders to determine which packet would be best suited to a child. For children aged 5-8, the team incorporated experiential activities (i.e., interactive storytelling, experiments) to allow “learning by doing” by means of coupling abstract concepts with real-life references [12]. As those aged 9-12 have a greater grasp of verbal and problem-solving skills, the team included activities like word search and crossword puzzles [13]. Lastly, considering adolescents aged 13-16 were known to have developed critical thinking skills and the ability to situate themselves in the world, the team centered their activities on reflective and community-centered acts [14].

Activities eliciting reflection and action were also proposed as scientific concepts can be best taught by connecting them to different phenomena experienced by children in their actual environments [15]. Stories and role-playing are also useful because children can position themselves in relation to a plot and participate in imaginary actions to encounter lessons in imagined situations. Considering these, stories have been made central to the curriculum, while ensuring that they are relatable and context-sensitive. Additionally, a summary

page reviewing important concepts has been added to emphasize the coherence and build-up of concepts. An FAQ was also included to help carers guide children in learning.

Active, constructive, and interactive are learning methods ranked in order of effectiveness [16]. Active requires an action like underlining text or choosing between options. Constructive includes producing outputs beyond the information present like giving reasons or planning and predicting outcomes. Interactive includes discussing a topic and receiving contributions or feedback through arguing, defending, or challenging information. Constructive activities are better than active ones because they allow learners to construct their own ideas by themselves, while interactive activities allow learners to get insights from others. These learning methods, graduated in effectiveness, are relevant to the recommendations made to include activities that encourage children to reflect and engage other household members and the community. More constructive age-appropriate activities have been included in the curriculum.

For materials made for ages 9-12, we added prompts for reflection in activities and refined the usability of the habit tracker depending on how many times a habit may ideally be practiced within a day (See Figure 4 and compare with Figure 2).

We refined the activities for ages 13-16 to reflect COVID-19 protocols more accurately. Lastly, we updated the handwashing section with more detail on good practices (See Figure 5 and compare with Figure 3).

#### ***Leveraging the Home-based Curriculum for Shared Learning in Households***

A home-based COVID-19 curriculum creates opportunities for children and carers to share in learning [17]. Many identified themes hinge upon children's potential to be agents of change within their communities. This has been documented in previous health communication efforts, particularly in disadvantaged settings wherein parents have limited education. In these studies, children were found to effectively relay health promotion concepts from school to peers [18]. In a study on hygiene in rural schools of Zambia, pupils were enthusiastic about engaging with parents—typically fathers—and were successful at constructing handwashing stations. Mothers also reported high trust levels in children in relaying important health information [19]. These enable children to set an example, police, and remind others about hygiene importance and other basic health promotion strategies. More importantly, engaging the household promotes behavioral change in the whole family.

Because home-based curricula engage carers in learning, their effectiveness relies partly on the carer's effectiveness as an agent in the child's learning, which can be a challenge. For example, parents with different educational backgrounds may interpret the instructions in various ways [20]. The curriculum has been revised by adding an FAQs section containing answers to children's questions to support carers through the learning process.

### ***Engaging the Community in the COVID-19 Curriculum***

Several themes and sub-themes recommend to involve end-users in curriculum development to improve contextualization. This helps capture the community's concept of health and material applicability to their context. For instance, it has been documented that struggles in survival, impacted by socioeconomic and political factors, often overshadow people's need to learn about health as seen in the health literacy materials development for an indigenous Ayta community in the Philippines [21]. To capture such issues, immersions and iterative consultations with local leaders, community physicians, and carers in co-developing the curriculum will be helpful.

Beyond the curriculum's development phase, children can engage their communities by sharing their knowledge, setting a good example, and initiating activities. The curriculum can empower children through activities that trigger practical and reflective questions like: "Who can my family contact for more health safety information and aid?" and "What can I do for my community?" Knowing that they have a role to play in their circles can motivate children to keep learning and translate lessons into action. Community engagement also adds relevance and extends the curriculum impact beyond the child. In this way, the curriculum employs service-learning, a method that integrates community service with academic study to teach community engagement and enrich learning, allowing children to learn that they can change their communities while giving them the skills, knowledge, and materials to do so [22].

### **Conclusion**

The co-development of COVID-19 prevention curriculum provided insights on learning needs and strategies for Filipino children through various academic, professional, and cultural lenses. These insights had direct implications on the curriculum content, structure, and delivery. These changes had to do with making the curriculum age-appropriate, including activities that were engaging and empowering to the child, and providing support for carers. Under the main theme of content, the team noted that key results highlighted

the need to focus on prevention rather than transmission, as well as the maintenance of good health using consistent and up-to-date health information. For structure, providing a summary at the end of the material was emphasized to reinforce new knowledge and habits. With a motivational approach that contains positive content, children will be more engaged in accomplishing activities, which is very important in curriculum implementation [23]. In delivery, the presence of family or household involvement was seen to be vital in stimulating behavioral change as parental or peer support provided guidance in using the curriculum. With the availability of materials to the child, it was seen how he or she could become empowered to spark change within his community. Lastly, in terms of feasibility and appropriateness to context, it was determined that consulting local leaders and contextualizing concepts in colloquial language aided in better understanding and combating COVID-19 denialism. While the curriculum could help in mitigating the spread of COVID-19, the team noted through the development of the material that encouraging hygiene in areas that are COVID-19-free could facilitate sustainable health-promoting behavior.

A home-based COVID-19 curriculum has the potential to effect change in households and larger communities. Through constructivist teaching and learning which trigger reflection, children are encouraged to think for themselves, interact with carers, and explore ways to help their [24]. The results of this study may be useful in creating COVID-19 and other health promotion curricula for children in similar settings.

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