

Students' COVID-19 experiences: Integrating knowledge, attitude, and practices strategies for teaching science

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Abstract: The junior and senior high school student experiences regarding their knowledge, attitude, and practices during the COVID-19 pandemic need to explore. This qualitative research uses a phenomenological technique with 20 students (10 JHS and 10 SHS) as a sample. Students learned about the illness through multimedia, filtering misinformation, self-driven data gathering, community support, and teacher-facilitated discussions. They also cultivated their attitude toward the disease through personal experiences and reflection on the pandemic, conducting activities such as experiments to test their acquired knowledge, considering community influences, and due to their self-motivation and appreciation of the right attitude during the pandemic. Finally, they executed practices toward COVID-19 with their parents' and peers' influence and support, collaborative team planning, learning from expert demonstrations, and participating in activity-driven action. JHS and SHS students have had a wide range of experiences during the COVID-19 pandemic regarding knowledge acquisition, inculcation of attitude, and practice implementation toward the disease. The student experiences are eye-openers to science educators. With this, there should be improvements in science education curricula that address the current pandemic and other unforeseen health issues.

Keywords: COVID-19; KAPs; secondary school student; teaching science

Introduction

The COVID-19 epidemic has impacted every facet of our society and its many subsets. This epidemic has rapidly developed into a pandemic, resulting in the implementation of stringent measures to combat the spread of the sickness around the world. Economic and health outcomes during the pandemic greatly affected human lives, including children (Bozzola et al., 2022; Duan et al., 2020; Meherali et al., 2021). Although few children are affected by the disease and show only insignificant symptoms, the disease and how to contain it negatively affect their well-being and mental health (Duan et al., 2020; Meherali et al., 2021). Even though all children will be affected, those with comorbidities and disabilities living in slum areas, conflict zones, and isolation centers will be at higher risk.

The Philippine Statistics Authority (PSA) published in May 2021 on their official website cited that the Philippine Development Plan for 2017-2023 stresses that kids are the most at-risk or vulnerable groups. Despite having many children, that are declared at-risk, the concerning problems remain and continue unaddressed in the Philippine population. In the Philippines, where poverty is prevalent, the COVID-19 pandemic can cause specific harm to children of less-educated and low-income parents, who may have lower socioemotional and academic skills compared to more educated or higher-income parents (Kalil et al., 2020).

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Children and every student in all parts of the world are directly affected by this pandemic physically, socially, and mentally. [Chandra \(2021\)](#) reiterated several adverse effects of the pandemic on college students in India who experienced fear of failure, academic stress, depressive thoughts, and feelings of boredom that diverted students from creative and educational activities. Furthermore, in the Philippines, [Galanza et al. \(2021\)](#) found that fear of COVID-19 is correlated with college students' adverse mental health. A qualitative study explored nursing students' experiences with COVID-19 in Korea. This study found that students felt isolated due to the changing way of life, feared being infected, were burdened with clinical practice during the pandemic, and were perplexed about unexpected circumstances ([Jin & An, 2023](#)). These student experiences described their emotional and mental health during the pandemic. Although there are already quantitative studies focusing on the student's physical health during the pandemic, like KAP (knowledge, attitude, and practice) studies. Qualitative studies are required to capture the student experiences in knowledge acquisition about the disease, attitude integration, and practice implementation toward COVID-19.

The knowledge variable examines how well students understand COVID-19, how it spreads, its signs, and how to protect themselves ([Buenita et al., 2022](#)). Students can be more confident in their actions and choices when they know much about them. But if they have false beliefs, it can lead to useless action, more fear, and less compliance with rules. The attitude variable focuses on how the students feel and think about the outbreak ([Rosoff-Verbit et al., 2021](#)). Students with a positive outlook might see the pandemic as challenging and change as needed, lessening their mental worry ([Ranjitkar et al., 2022](#)). Students with negative views, like fear or doubt about how bad the disease is, may have trouble with their mental health because they are more anxious and do not want to take precautions ([Jeong et al., 2020](#)). Lastly, the practice variable looks at how the students put their information and attitudes into action, such as by wearing masks, keeping a safe distance from others, and following hygiene rules ([Simionescu et al., 2022](#)). What students do affects how likely they are to get sick and how stressed they are. If students do not use effective practices because they do not have the tools or do not think they work, their risk level and anxiety go up ([Correia et al., 2020](#)). In the age of pandemics, these factors affect the student experience in many ways. If a student has enough information, a good attitude, and does what works, their experience may be marked by their resilience and the ability to cope ([Leroy et al., 2021](#); [Szabó et al., 2020](#)). But if they do not have any, they might feel alone, scared, or sick because they are not doing things right ([Williams et al., 2018](#)). By carefully looking into these factors through qualitative studies, researchers can learn more about how students' lives are complicated ([Pereira et al., 2022](#)). It could help them develop ways to help students deal with problems caused by the pandemic.

People worldwide gather information about the disease by actively monitoring and watching the news to be aware of the disease that is currently affecting the community and what is to come. Because they are concerned with it, most people in the Philippines, especially students, are tracking how the virus spreads throughout their communities ([Superio et al., 2021](#)). The anxiety they are experiencing may be a harmful side effect of the information they have acquired and the preventative steps they have come to believe in. In addition, [Lu \(2016\)](#) held the belief that unpleasant conditions or uncertain surroundings frequently prompted people to feel the need to search for and acquire new knowledge. It enables individuals to gather sufficient and possibly accurate knowledge about a circumstance to make informed judgments and acts, frequently not just for themselves but also to benefit others. Additionally, students inquire about remedies available if they contract an infection and preventative measures to ward against infections ([Majid et al., 2019](#)). These student manifestations should be understood not just quantitatively but also qualitatively.

This study qualitatively explored the experiences of ten junior and ten senior high school students enrolled in public high schools in DepEd Cebu City during the COVID-19 outbreak. The JHS student consists of six male and four female students. And three male and seven female students in senior high school. It aimed to understand how the JHS and SHS students learn about the disease, inculcate attitudes and implement practices toward it.

Method

A phenomenological design was applied as a qualitative research method for this study to explore the secondary school student experiences regarding their knowledge, attitude, and practices (KAPs) toward the COVID-19 pandemic. Students' knowledge of COVID-19 was used to measure the knowledge variable. How they know the virus spreads, what signs it can cause, how bad it is, and how to avoid getting it. The attitude variable was measured by asking them how they felt about the pandemic. The key signs included how bad they thought the virus was, how scared they were, how they were willing to change, and how they felt about the pandemic. The practice variable was confirmed by also asking students how they used the information they had learned and the attitudes they had formed. Their practice was measured by how often they wore masks, stuck to social distance rules, took care of their cleanliness, and followed safety rules. The researchers coordinated with the school heads and advisers of the junior and senior high school classes. These school personnel were the key to the conduct of the

focus group discussion. Twenty students (10 JHS and 10 SHS) participated in the focus group discussions (FGD). Students were randomly picked for the FGD. The discussion that took place in the focus groups was guided by a set of interview questions that were only semi-structured. The interview protocol, which included the research questions, was used throughout the focus group discussion.

Data collection took place during the School Year 2022–2023, and it took place in all of Cebu City's public junior and senior high schools. The researchers wrote a letter to the Schools Division Superintendent in which they discussed and outlined how the research would be carried out and the potential risks and rewards of the endeavor. The researchers arranged and conducted the focus group discussion (FGD) to administer interviews to the selected respondents about their information acquisition, inculcation of attitude, and implementation of practices regarding COVID-19. The respondents were either emailed or given a hard copy of the study information and an informed consent form. The FGD was carried out with the use of technology for video conferencing. After the initial assessment of the transcripts and the data, a coding procedure was carried out to mark text sections with codes, analyze codes for overlap and redundancy, and compress these codes into broad themes. This was done after the initial review of the transcripts and the data.

During the study, the researchers considered all the relevant ethical issues. These included the risk-benefit assessment, content, comprehension, and documentation; authority to access private information; confidentiality protocols; and conflicts of interest. Exemption from the ethical review was granted by the ethical review board of the Cebu Normal University Research Ethics Committee since the participants in this study were exposed to no or shallow hazards, and the study caused them minimal inconvenience. Before the beginning of the data collection phase, the respondents were briefed on the purpose of the study, informed that their names would be kept anonymous, that their responses would not in any way influence their academic achievement, and that they had the option to withdraw from the study at any time. All of this occurred before the data collection phase began. As evidence of the participant's agreement to participate in the research, the researchers collected either the participants' handwritten or digital signatures.

In analyzing the data, the researcher first transcribed all the discussions from each focus group. It ensures that details are anonymized for confidentiality. Rigorous manual coding is then performed on the transcriptions. Each phrase, sentence, and paragraph examine and assigns a code based on its core concept or meaning. This process is called open coding in the first phase of data analysis in qualitative research. This phase helps to break down, examine, compare, and categorize data. Then, the axial coding phase, where codes with similar content are grouped into categories. Categories are higher-level concepts under which related to gathered code. It is a way of reassembling the data that was broken apart during open coding. The researcher examined the relationships between these categories to study the phenomena. The final step was selective coding, which involved integrating the categories to form a theoretical framework. The researcher identified a core category that connected all other categories and structured these around the core to form the basis of a grounded theory. They used this theory to explain the JHS and SHS students' experiences and attitudes toward the COVID-19 pandemic. Throughout the process of data analysis, the researcher employed constant comparison. As new data are coded and classified, it compares to previous data to refine categories and build a comprehensive understanding of the patterns and themes emerging from the data. This iterative process achieved in-depth insight into the research problem, providing a nuanced understanding of how students' knowledge, attitudes, and practices that shaped by student experiences of the pandemic.

Results and Discussion

Acquisition of knowledge

Knowledge about COVID-19 drives the behavior of the students toward the disease. During this pandemic, students have done their methods of acquiring knowledge about this. Their knowledge-acquisition methods would differ from student to student depending on their situation and demographic profile. Five themes generated in students' experience in acquiring knowledge about COVID-19, namely: 1) the flexibility of multimedia as a primary source of acquired information; 2) methods of filtering information to correct misinformation; 3) student-driven data gathering; 4) collaborative support from the community; and 5) teacher-facilitated discussions.

The flexibility of multimedia as a primary source of information

The first theme envelopes how the students acquired their knowledge of the pandemic. Students acquired and learned information about the pandemic through watching media, reading printed-based sources, and listening to the radio. Students were able to gather knowledge regarding COVID-19 through the use of social media. Most obtain COVID-19 information via social media platforms and applications such as Facebook, TikTok, and YouTube.

Participant 16 said, *"I am very comfortable getting information from watching YouTube videos and writing them down so I can easily remember them"*.

The widespread adoption of these programs among students may be attributable to their widespread appeal. TikTok was discovered to be the most addictive application during the COVID-19 epidemic, according to a study that was carried out on adolescents in Italy. This put it ahead of other top-rated programs with comparable visual affordances (Marengo et al., 2022). This is comparable to the findings of (Mohamed et al., 2021), which indicated that students' primary sources of information about the disease were social media (73%), like TikTok and Facebook, followed by television (49%). Social media, such as Facebook, was a frequently cited source of information. Television was mentioned more than any other medium as a primary source of information regarding the disease, according to the findings of (Anagaw & Guadie, 2023; Gasiorek et al., 2023; Romer & Jamieson, 2021; Superio et al., 2021).

Due to the proliferation of Internet use and reliance on social media sources like YouTube, Facebook, Twitter, and TikTok, the landscape of information gathering has been significantly altered (Massey, 2016). Increased reliance on social media as a source of health information has led to a rise in conspiracy theories and anti-vaccine sentiments and a decline in trust in organizations such as the WHO and government agencies (Featherstone et al., 2019). Skafle et al. (2022) concluded that individuals who obtain their information from largely uncontrolled social media sources, such as YouTube, whose recommendations are modified based on viewing history, and who have overall conspiratorial beliefs are less likely to be vaccinated.

Methods of filtering information to correct misinformation

This second theme focuses on how the students get the information and filter them to combat fake news. Students did these through note-taking, reflecting, and examining it to correct misconceptions.

Participant 13 narrated, *"Our teacher gave us information about COVID-19 and asked us to examine fake news about it. She mentioned that a virus causes it"*.

The best way to combat misconceptions and misinformation about the disease is to examine the source of information. In addition, properly analyzing myths and misconceptions is crucial in a disease outbreak since these might affect preventive and containment measures (Skafle et al., 2022). When students examine the information about the disease, they discredit and discriminate against unimportant and irrelevant information. They may then have the proper knowledge about the disease.

Student-driven data gathering

This theme points out the importance of students' interest and motivation in getting information during the pandemic. Students can learn more when motivated and have that intrinsic passion for learning.

Participant 11 said, *"I want to become a nurse and am very interested in learning about it. I read articles available on the internet. It helped me learn about the pandemic."*

Students use self-initiated learning for anything they are motivated to learn, whether for a hobby, ambition, or more on their personal-related. Also, acquiring knowledge about the pandemic is everyone's concern. Most people, including students, want to learn about the disease because it threatens one's health. That is why self-initiated learning is one of the common ways to know more about the disease.

Collaborative support from the community

Another theme that summarizes how the students acquired their knowledge of the pandemic is shown in theme 4. Students received and learned about the pandemic through collaborative input from family and friends.

Participant 5 said, *"My family shared information about COVID-19 with me"*. Participant 3 also said, *"My grandfather listened to the radio to get news about COVID-19 and talked to me about it."*

Available information about the COVID-19 pandemic is everywhere. Everyone is affected by the pandemic, including the students. Almost everyone has access to information to know more about the pandemic. Students, in particular, get and learn information about this pandemic from the sharing of their family and friends. The family members share the information when they gather in their homes. The students, especially during the first phase of the pandemic, may only get and learn about the disease from their family, friends, and neighbors. Homes are the first schools of the students. Home support affects the student's development, learning, and academic performance (Wai-Cook, 2020). It directly supports students' learning before and during formal (school) education and facilitates factors such as

hygiene, nutrition, and health (Linde et al., 2022). Collaborative learning has been a way to learn about COVID-19 at home and neighborhood. Collaboration at home and in the area can be sharing authority and accepting responsibility among family members and friends (Ranjitkar et al., 2022; Shah et al., 2021).

Teacher-facilitated discussions

The last theme in students' knowledge acquisition focuses on the teacher's assistance in building learning among students about the disease and the pandemic. Students learn about COVID-19 from their teachers and classmates.

Participant 1 said, *"I learned a lot about this pandemic after doing our group project on making COVID-19 infographics. Our group members contributed a lot to make that project"*.

They collaborated to form ideas and learnings about the disease. Teachers are the right person to facilitate acquiring information about the disease among the students. The community and the health sector view formal education as necessary in solving society's health issues like COVID-19 (Intania & Utama, 2020; Meinck et al., 2022; Walters et al., 2022). One of the learning approaches used in the school is collaborative learning. It shows that teachers and students used this strategy to develop socio-cognitive collaboration on learning and acquiring knowledge about COVID-19. The underlying assumption of collaborative learning in this sub-theme can be based upon the consensus of creating ideas about the disease through student cooperation, contrary to competition in which students beat other students (Meinck et al., 2022; Miller et al., 2021; O'Brien et al., 2020; Selvaraj et al., 2021).

Cultivation of attitude

Knowledge is directly correlated to attitude. Students' knowledge can significantly affect values, feelings, motivations, and appreciation toward hygiene education. There are four themes generated in cultivating students' attitudes toward COVID-19, namely: 1) experience as the best teacher; 2) the cultivated attitude in every eureka moment; 3) the importance of the community in attitude formation; and 4) attitude as the reflection of a student's personality.

Experience as the best teacher

The theme covers how the students inculcate an attitude toward COVID-19. Students generate attitudes toward the disease through personal experiences and anecdotes from people with COVID-19. Students' attitudes toward COVID-19 develop due to their personal experiences. As they say, experience is the best teacher.

Participant 13 said, *"I felt I had COVID-19, the whole family. That is why I believe in boosting our immune system."*

Their experiences with the disease made them realize and appreciate the behavior they need to prevent contracting it. Their involvement and encounter with the disease or the pandemic challenged them to learn and inculcate something they can use in the future. Students became co-designers of their learning, and their knowledge here is more personal and authentic. As they say, experience is the best teacher. Their experiences with the disease made them realize and appreciate the behavior they need to prevent contracting it. Their involvement and encounter with the disease or the pandemic challenged them to learn and inculcate something they can use in the future. Students became co-designers of their learning, and their knowledge here is more personal and authentic.

Moreover, the students inculcated attitudes toward COVID-19 through the stories of those who had experienced the disease (Intania & Utama, 2020; Mohamed et al., 2021). Students needed to learn from these anecdotes because they feared and believed this disease could also affect them. With this, students developed the attitude that is essential in preventing from contracting the virus (Mohamed et al., 2021). Through relatable anecdotes, students can heighten their understanding of the disease and empathize with those who experienced COVID-19. Thus, it increases the chance for students to remember and inculcate attitudes toward the disease. Anecdotes have been used as a teaching strategy to help students better comprehend the world around them and help them visualize themselves in similar situations to the person in the anecdote or story.

The attitude formed in every eureka moment

The second theme points out how the students inculcate an attitude toward COVID-19. Students generate attitudes toward the disease through guided and incidental discovery guided experiments, learning by doing, self-discovery, and experiential learning.

Participant 7 said, *“My mother will always tell me to sleep early, and then I realized that this is to boost my immune system.”*

Students inculcated attitudes toward COVID-19 through guided discovery. With the help of available materials like YouTube videos and parental guidance, students were able to find their ways of developing values and beliefs. In education, the prime objective of guided discovery is to produce excitement and interest in the classroom and other learning resources and assist students in investigating their possible uses. It also delivers opportunities to present vocabulary, assess students' prior knowledge, and teach responsible usage and care of learning materials. The students who inculcated attitude through this method used the available learning materials, examined the uses and reliability of the materials, experimented, and learned based on the guided instruction. Students may have related increased learning and information retention with these behaviors. It supports the learning goal that learners can recall and apply what they have learned in real-life situations.

Students' attitudes were also formed through their encountered incidents. Students accessing incidental knowledge and learning opportunities can increase their literacy about COVID-19 and improve their attitudes toward it (Wu et al., 2022). Access to this accidental discovery and learning about the disease can foster a student's fund of knowledge, initiating at home and continuing to school and within the community. Hence, incidental learning in this situation can be a social, lifelong, and academic phenomenon. It is relevant to how students acquire knowledge about COVID-19 and inculcate their attitudes toward it. In the case of incidental learning as a functional teaching-learning strategy, Elgort et al. (2015) believed that incidental learning tasks work well with boring topics and memorization because they help in motivating to learn the lessons or skills that are generally perceived by the students as not very stimulating but are part of the curriculum.

Importance of the community in attitude formation

The students' inculcated attitude occurred when their family members consistently showed attitudes toward the disease.

Participant 11 said, *“I was thinking of limiting my cigarettes because my sister, who works as a nurse, said that people who died due to COVID-19 had comorbidities and were chain smokers.”*

These behaviors influenced their way of inculcating and developing attitudes. Parents' and family members' modeling affects the students' beliefs and values. Whether it is a good action or not, students will observe and follow that behavior and may bring it when they mature. The home environment is the principal source of hygiene exposures and the development of proper hygiene behaviors of students, thus the primary key to health quality for students. Cleaning that takes place at home, students are likely to learn, which provides opportunities for parents to act as health and hygiene role models (Linde et al., 2022).

The community where the students belong is also an influencing factor in their inculcation of attitudes toward COVID-19. The community gave students a sense of belongingness and identity and helped them define the right or wrong attitude toward the disease. The community has also become a learning agent because it is where the students learn the value of cleanliness and proper hygiene. A community can help the school in such ways for the student's educational development and academic improvement. The qualified and learned students deliver their service for community development. Thus, school and community are closely allied and interconnected for a bigger society mission to create a strong foundation for a learning society.

Attitude as the reflection of a student's personality

This theme shows how the students inculcate an attitude toward COVID-19 through students' self-realization, appreciation, and motivation.

Participant 6 said, *“I watched the news update about COVID-19 and realized it was really serious. I was afraid and tried not to go out of our house.”*

The identified theme describes the importance of students' involvement in forming their learning and attitude toward COVID-19. The learning process can be more personal and authentic when students are involved or engaged in a particular issue, like this COVID-19 pandemic. Creating unique and authentic experiences is a self-motivated process to improve the value of life and increase survival according to the student's current situation (McWilliams, 2015). It can translate to experiential learning, in which students experience and discover the values, beliefs, and attitudes necessary during the pandemic.

Execution of practices

Knowledge and attitude are directly correlated to practice. Students' knowledge and attitude can

significantly affect students' practices toward COVID-19. Four themes were generated in students' experience in implementing practices towards COVID-19. These themes were further grouped depending on their similar thoughts. There are 1) parental and peer support and influences; 2) executed practice resulting from collaborative team planning; 3) demonstration in teaching and learning; and 4) activity-driven and participative executed practices.

Parental and peer support and influences

The first theme encompasses how the students implemented their practices toward COVID-19. Students implemented their practices toward the disease through support from their friends and parental guidance and supervision.

Participant 5 said, *"My mother asked me to show how to sneeze in front of the public."*

Role-playing was a method to show how the students implemented their practices toward COVID-19. It had become a good technique for the students to investigate realistic situations by acting with their family and friends (Kalil et al., 2020; Ranjitkar et al., 2022). This technique was guided to foster experience and test different practices toward the disease in a fully supported setting. Depending on the goal of role-playing, students might be doing a role or practice like their learning or could do what they had told them to do. These options give them the possibility of acquiring significant learning. Their way of implementing the practice toward the disease can allow the experience to be achieved. On the other hand, when students do what they had told to do, this can encourage them to foster an understanding of the pandemic from the view of other people.

Executed practice as a result of collaborative team planning

The second theme covers how the students implemented their practices toward COVID-19. Students implemented practices toward the disease through collaborative learning, planning, and actions with classmates and friends.

Participant 3 said, *"I was with my friends, and we compared our ways of washing our hands by showing our style of washing our hands."*

Students implemented their practices toward COVID-19 through an approach by which specific short-term practices and tasks toward the pandemic were described and executed. This approach is distinct because it accomplishes objectives in the short term, just like handwashing and wearing facemasks. It is common among students during the pandemic since it is flexible, and their practices can be improved according to the needs of the current health issues. Its flexibility can make the practice less dangerous, so if a particular practice of COVID-19 goes wrong, no harm to students. It implies that tactical planning can be used in the teaching-learning process in which students can plan and break down their academic tasks to attain long-term goals.

A strategic plan of action was also used to implement their practices toward COVID-19. Strategic planning has been setting goals for the students during the pandemic, deciding what action to take to achieve them, like a healthy lifestyle and COVID-19 prevention, and organizing the resources needed (Luo et al., 2021; Shi et al., 2022). This strategic planning of activity is the long-term planning of the students for survival during and after the pandemic. It can help boost the student's internal morale and confidence. It could mean that this strategic plan of action can be a good strategy for the students to increase their motivation and confidence to pursue their goals in life. Teachers with this strategy can have confidence that efforts done by the students are purposeful and coordinated, which builds credibility in their foundation of learning. Likewise, students can easily track time-bounded results and monitor and evaluate progress toward their goals.

Demonstration in teaching and learning

This theme gives the importance of demonstration as a method of teaching the students to implement practices, and students show or demonstrate as their way to assess their learning.

Participant 19 said, *"A barangay official came to our site (village) and executed how to wash hands properly, and then we followed him and showed others how we did it."*

Demonstration and planned actions are behavior-aligned techniques in which students can implement their practice towards COVID-19. They may be given different learning materials and other resources about the disease. However, they can have their way of implementing their values, beliefs, and practices. When the students ask to demonstrate and act on their practices repeatedly, then mastery is achieved. Executing the learned concepts and skills helps consolidate and assess knowledge after completing a particular lesson. Students who demonstrate their learning can provide a teacher with immediate

feedback about students understanding.

Activity-driven and participative practices

This theme sums up the daily activities done by the students to implement practices towards COVID-19. This also shows that students participated in activities to polish their practices.

Participant 11 said, *“I have a routine every day. I wake up early, take a bath, clean the house, eat healthy food, and then exercise. I do this so I can have a healthy body.”*

Participative demonstrations happen when students have difficulty connecting knowledge about COVID-19 to actual practice or when students are not able to recognize applications of acquired knowledge and inculcated attitudes toward the disease. In a participative demonstration, students are encouraged to become actively engaged in implementing practices toward the disease (Barrot et al., 2021; Chandrasiri & Weerakoon, 2021; Jiang et al., 2022; Mohamed et al., 2021). This method can increase students' awareness, knowledge, and value of responsibility as a citizen in the community. It could mean that it is not only to involve students' interest in acquiring knowledge and inculcating attitude but also to engage them in more practical actions and behavior, to link their academic performance with real-life issues like COVID-19 and to understand the effect of the individual activities and motives in the community.

Strategies for integrating KAP in teaching science subjects

The epidemic caused by COVID-19 is an excellent chance to improve the pedagogical theories and principles that underlie science education. It was discovered that the students employed several strategies to acquire knowledge about the illness or pandemic, cultivate the right attitude, and practice the appropriate activities in response to the pandemic. These strategies are pedagogies that have the potential to be relevant and appropriate in the process of achieving the learning objectives related to scientific concepts. To integrate KAP in teaching science subjects, teachers can start with acquiring knowledge through the identified strategies. Teachers can employ the flexibility of multimedia, facilitate methods of filtering information to correct misinformation, provide student-driven and group activities that let students gather information from the community, and have teacher-facilitated discussions. For the cultivation of attitudes, teachers can use experiential learning activities such as self-discovery and guided experiments. Teachers can also invite experts for a certain job or show the updates coming from the experts to help students inculcate attitude. Asking the students to reflect on their learnings or knowledge about a certain topic can be a good method to discover and form an attitude. Lastly, teachers can use pair or group activities like role-play to let the students execute their knowledge and understanding of the lesson. It can be done through collaborative team planning. Teachers can employ demonstration in teaching and learning to let students showcase their comprehension.

Conclusion

Secondary school students have had a wide range of experiences during the COVID-19 pandemic regarding knowledge acquisition, inculcation of attitude, and practice implementation toward the disease. Students learned about the disease through the flexibility of multimedia as a primary source of information, filtering information to correct misinformation, self-driven and initiated data gathering, collaborative support from the community, and teacher-facilitated discussions. They also inculcated their attitude toward the disease through their personal experiences and reflection on the pandemic, conducting activities like experiments to test their acquired knowledge, considering the influences of the community, and due to their self-motivation and appreciation of the right attitude during the pandemic. Lastly, they implemented practices toward the disease through the influences and support of their parents and peers, collaborative team planning, learning from demonstrations of the experts, and participating in activity-driven practices.

The student experiences are eye-openers to science educators. It is an opportunity to assist the students in acquiring knowledge, inculcating attitudes, and implementing practices to address this pandemic and other health issues. Science educators can facilitate students' correct understanding of the pandemic by examining available facts and research-based knowledge. Attitude towards the disease can be inculcated by using experiential learning. Educators have been using this, but this should be strengthened, especially in science education. Learning by doing and practical knowledge should be used to improve students' practical application for disease prevention.

Limitations and Future Directions

The student narratives and experiences serve as the basis for the analysis as well as the findings of this

study. Given the large number of students in DepEd Cebu City secondary schools, the number of students as a sample is limited. The students' experiences in Cebu City are one-of-a-kind and distinct from those of other students in the province or the entire country. Problems during the research included students who did not comply and lacked the motivation to respond to the questions. The audio and visual outputs were challenging to manage because of video conferencing.

The COVID-19 pandemic, like any other unforeseeable health crisis, should be addressed more thoroughly in educational programs, especially in science. Schools and science educators should work with medical community members and government authorities to promote health education initiatives. The suggestion is to conduct further research related to investigating the experiences of elementary school children during COVID-19 in terms of their information acquisition, attitude inculcation, and practice application. In addition, there should be training programs for educators to prepare adequately to inform kids on how to avoid contracting COVID-19 and control it.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

R.W. Origenes: methodology, validation, analysis, writing—original draft preparation, and review and editing. **B. A. Alejandro:** analysis and validation.

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