Practices of Secondary Science Teachers on Collaborative Learning Instruction in an Online Setting

Roceanne Lyca T. Dayday, Jayvee G. Flores, Rosalie Tomada

Cebu Normal University, Cebu City, Cebu, 6000, Philippines

Abstract

The study aimed to identify the Practices of Secondary Science Teachers on Collaborative Learning Instruction in an Online Setting. The study used a Husserlian method of phenomenological research. Recorded interviews were conducted virtually with five secondary science teachers as participants who were teaching online from different private schools. Researchers of the study served as the research instrument. After analyzing the transcripts individually and as a whole, five themes were identified: (1) Recorded Asynchronous Activity (2) Asynchronous Experiments (3) Multimedia as aid for experiments (4) Group Research (5) Application of practices from face to face set up. Some of the findings from this study included the need to use both synchronous and asynchronous activities for the students to have an engaging collaborative learning. The five themes revealed the overall structure of awareness of what were the practices used by teachers to teach secondary science online.

Keywords: collaborative learning, science, secondary teachers, synchronous, asynchronous

1. Introduction

Collaborative learning centers around the idea of keeping the students engaged in a small group to improve their learning. The main goal is to actively involve the students in the lesson by letting them socialize and share their ideas with others. The success of collaborative learning relies heavily on the teacher's choice of activities. The implementation of K-12 online education has made a huge impact on the preparation and execution of collaborative activities. It's not just the implementation of activities that are badly affected, but also the monitoring of how effective the activities are making the whole situation even challenging for teachers.

With the challenges in conducting collaborative learning in an online setting, this calls the teacher's effective practices on providing efficient collaborative learning instructions. Collaborative learning applied in Science classes makes students actively involved in their learning process, achieve sustainable acquisitions, and increase their motivation and interest (Petrescu et al., 2018). According to the American Association for the Advancement of Science (1989), teaching science and technology education should be aligned with the principles of scientific inquiry, and collaboration is an essential part of scientific inquiry. Unfortunately, teaching secondary science education introduces some incomparable obstacles during online classes.

Today's science should prepare students to meet the demands and overcome

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the obstacles that they will face in their workplace. To achieve work excellence, not only understanding but also communication skills, leadership skills, critical thinking, and listening skills are needed. According to American Association for the Advancement of Science(1989),to ensure that the collaborative nature of scientific work will be accomplished, frequent group activities should be conducted. Students need to learn how to blend working with a group and take responsibility. The involvement of students during classes or activities not only gives them the chance to showcase their creativity but also giving them the freedom to collaborate and share ideas with others.

Several studies have revealed that effective classroom learning can be linked to the teachers' practices (Brophy and Good, 1986; Wang, Haertel and Walberg, 1993). Teaching practices are ways of how instructions are implemented (Hunter and Rasmussen, 2018). The success of online collaboration heavily depends on the teacher's practices. Basically, teaching practices include almost every action a teacher does inside the classroom from classroom monitoring and management and construction and presentation of lessons. It's not a secret how important collaboration is to students especially in Science subjects, and teachers understand the possible implications if this will be neglected. It is very important for teachers to include collaboration to his/her set of practices.

Online learning should enable students to withstand all difficulties of their daily activities. Thus, teaching method should improve not only academic skills but also social and cooperative skills as suggested by educational agencies from time to time. According to the National Science Education Standards (1996), teachers should include the students in the planning of activities by listening to their ideas and sentiments. Keeping them involve not just in the execution of activities but also in the planning process. Huge outcomes require huge preparations as well. Along with the views and opinions of the researchers, practicing a collaborative approach of Secondary Science Teachers in an online environment presents new challenges, and believes that the success of online collaboration depends heavily on the teachers' mindset and practices.

2. Methods and Materials

Research Design

This study is fundamentally a Husserlian method of phenomenological research based on a semi-structured interview with Junior High Teachers teaching Science in an online set up. The study aims to identify the practices used by Junior High School Science teachers to ensure that students can still work collaboratively in an online setting.

Research informants/Sampling Frame

The primary source of data in this study were five participants composed of two females and three males secondary private teachers. The inclusion criteria were based on the following: (1) secondary teachers, (b) teaching online, and (3) handling Science subject.

With the restrictions brought by the pandemic, interviews were conducted through Google Meet or Zoom video call. It

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was recorded for documentation purposes. Interviews were conducted according to the participant's time of availability and was done with one individual at a time. Participants can avoid answering questions if they prefer to. The interviews of each participants lasted from forty to sixty minutes.

The participants were asked to tell some of their personal information such as their names, name of the school they are currently teaching, number of years in teaching, and subjects handled. They were also requested to share and narrate in detail their lived experiences, successes, difficulties, struggles in teaching science using and conducting collaborative learning instruction in an online setting.

The study used a qualitative design and utilized the researcher as the research instrument, and data saturation was used to determine the number of participants needed in the study. The study interviewed five informants because data saturation was reached and no additional themes and sub-themes emerged from the succeeding interviews.

Ethical Consideration

To ensure that the ethical standards will be followed, the researchers discussed to their respondents everything they need to know during the interview. The discussion includes the content of the research, why they are chosen as participants and the goal of conducting the study. Moreover, researchers should inform the participants that they can withdraw from participating anytime if they desired to. During the interview, participants have the right to avoid answering questions they don't want to respond to. Guaranteed them that protection of their identities will be prioritized. Aside from the verbal discussion, the informants will be given consent which contains the necessary information they need to know before the interview. Lastly, participants can ask for the results/findings of the study from the researchers if they wished to.

Gathering of Data:

Before conducting the interview, researchers made sure that the consents were signed and approved by the informants. Researchers discussed the schedule with the participants to give time for both parties to prepare. With the restrictions brought by the pandemic, interviews were conducted through zoom video calls. Interviews were recorded which lasted for 30-60 minutes. Participants were informed that there will be follow-up questions to further improve data gathering. After the completion, interviews were transcribed verbatim, and answers that were not in English had remained as they were. Confidentiality of the subjects was strictly followed throughout the duration of the interview by using pseudonyms that only the researcher and participants can identify.

Data Analysis:

The Interview transcripts were analyzed through thematic analysis. The data analysis was done through 3 different steps: the first step was the detailed reviewing of the recorded video file and formulating drafts for the initial themes: the second step was eliminating themes that aren't specifically relevant and not common to all the respondents; the third step was modification

and finalization of themes according to the desired content.

3. Results

Five themes have emerged after analyzing the data namely (1) Recorded asynchronous activity (2) Asynchronous Experiments (3) Multimedia as aid for experiments (4) Group Research (5) Application of practices from face to face set up.

Theme 1: Recorded Asynchronous Activity

First theme of the study is the Recorded Asynchronous Activity. This theme entails the respondent's practice of monitoring the students if they work collaboratively with the group.

Respondents have discussed how they made sure that the students work collaboratively by requiring them to record almost everything from virtual group preparation up until the output or reporting has been delivered.

"What I did to make sure that they do their task, I let them take a picture or video and send it to my messenger. Para makaensure ta nga groupmates nga nitabang, I let them send their output and mga butang nga natabang nila or na nacontribute." – Respondent 3

"I asked them kung mada nila nga mag group meeting sila naa silay recorded discussion sa ilang meeting, ang mga di kaapil, hatagan lang silag role sa ilahang group and then kung di gane kaapil dapat naa silay buhaton, mag ask pud kog recorded discussion jud." –Respondent 5

Theme 2: Asynchronous Experiments

Second theme is conducting of experiments asynchronously. This describes the respondent's practice of making sure that students can still conduct experiments despite the limited time allotted for synchronous classes.

Respondents have shared common dilemma which is the shortened time for synchronous classes. Since experiments demand ample time, respondents have addressed this issue by letting their students conduct experiments asynchronously and let them record it. They also clarified that they only allow experiments that are not hazardous.

"In experiment man gud, all the time it is hard to have experiment in an online setting, here in our school we have experiments in performance task which serve as their assignment so they make their experiments not in the virtual classroom. Ang akong gihimo gud like mag pa experiment like for example karon nag pa plant propagation mi, so ang ako is nag pa take ra ko picture sa ilahang output." – Respondent 3

Theme 3: Multimedia as aid for experiments

Third theme is, multimedia as aid for experiments. This entails how the respondent's value safety by using multimedia as an aid or alternative for experiments.

For hazardous experiments, all respondents mentioned that they don't allow their students to conduct it at home but instead they will just look for a video online and send it to their students. The respondents

also acknowledged the idea that it might compromise the learning of the students but prioritizing the safety of their students should be their number one priority.

"In chemistry, we were actually told that we need to make sure that our experiments are actually safe. When we talk about diffusion it would be diffusion of a certain gas in lab, for topics like chemical reaction we actually allow students to perform chemical reaction with safety equipment but now we were limited. Maybe the disadvantage of letting them do it at home without our supervision, they may create or produce certain compounds that they do not know that are noxious. Instead of doing it in laboratory, I gave them video coming from the internet wherein there are actually chemists doing the actual reaction and they will observe nalang" – Respondent 4

One respondent mentioned that sometimes she conducts the experiment herself while recording and send it to her students.

"Usahay akoy mag video na nag experiment and ako lang ipatan aw nila nya naa lay questions" – Respondent 5

Another respondent mentioned that she uses simulation as an aid for some of her experiments.

"Find any kind of simulation nalang to help or aid the learning process in the midst of pandemic." – Respondent 2

Theme 4: Group research

Fourth theme is group research or case studies. This describes the respondent's practice of letting the students conduct research or case studies for topics that requires them to do so.

The respondents have mentioned that they still allow students to conduct research or case studies but only for those topics with data that can be gathered at home or in their baranggay. The respondents mentioned the importance of dividing tasks per member so they always make sure that tasks are evenly distributed before they conduct their research or case studies.

"Sa akong Earth Science, gi group nako sila sa ilang final output, mag choose silag one community or barangay na ilahang I identify kung unsay environmental problem or issues and then Interview sa barangay, mas maayo if sa ilahang barangay and ask sila unsay mga action na gi take sa barangay officials." - Respondent 5

"On the topic on, tracking of tropical cyclone. The work would actually be done by group of students. They are to track the movement of tropical cyclone. Much of what they do is reflective. There are students who will monitor the speed, coordinates, there are those who get the data for the water, reporting. I group the students they are given a data and they plot the movement of the cyclone then I ask them to do interpretation and there are guide questions." – Respondent 4

Theme 5: Application of practices from face to face set up

Fifth theme is the application of practices from face-to-face setup to the new set up. This theme describes how respondent's still uses their practices from face to face set up to this new set up.

Respondents have mentioned that they still use or apply some practices from face-to-

face despite the major differences between the mentioned set ups.

"The interpretation of the data, I was able to use interpretation of data in Science, I give them a certain type of data or topic. In a face to face setting they are given that and then they are to research and present it after. The same way in an online setting we actually give them a data then allow them to work on the data and present the data later on."

– Respondent 4

One respondent mentioned that she still uses the routines she had during face to face set up.

"Sa amoang motivation. Before we start naa jud na siya perme and then our guided practice. Our school encourage us nga naa jud na ang guided practice." – Respondent 5

Framework of the Themes of the Study
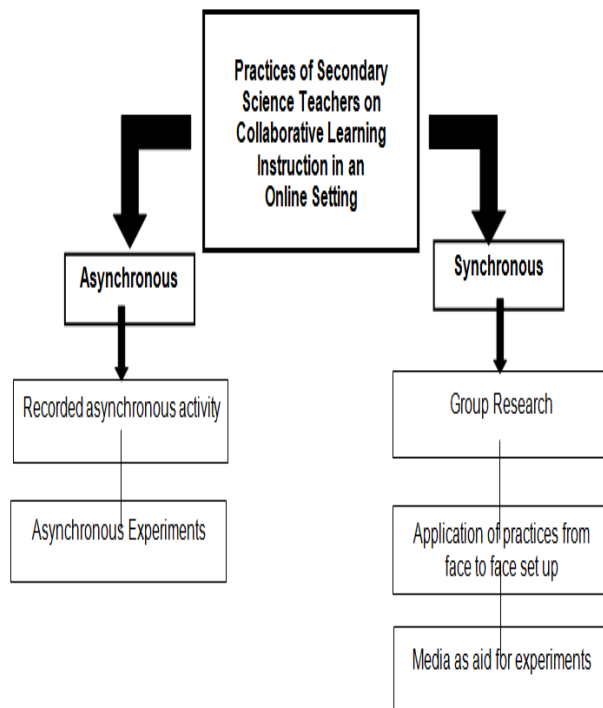
4. Discussion

The study shows the practices used by the Junior High School Science teachers from different private schools in Cebu who were implementing online learning.

Virtual learning is additionally asynchronous, which implies that a group doesn't generally need to interact at the same time (El Mansour & Mupinga, 2007).

That is why the first theme of this study centers on the Recorded Asynchronous Activity that has been done by a group of assigned students.

Respondents have discussed how they made sure that the students work collaboratively by requiring them to record almost everything from virtual group preparation up until the output or reporting has been delivered.

The freedom to decide when and where to participate during online classes leads to greater motivation to strive. (St.Clair, 1999)

"Tuesday and Thursday mag answer sila or mag peform sa mga activities nga ako I post. Example reporting, maghimo sila ug ilaha google meet and mag record sila sa ilaha reporting or group study ba kaha mag record sila sa ilaha pag study as a group". – Respondent 1

Information and ideas can easily be accessed outside the classroom before the every class meeting which leads to deeper processing of activities and when they review their hands-on recorded file. The respondents made sure that their students collaborate and it must be seen on the recorded file.

According to the recent article published by Viewsonic Library Education, 2020,

asynchronous learning includes any lesson during which the teacher teaches at a different time than the students attend the lesson. Asynchronous learning provides flexibility and accessibility. Since we are now within the world of online learning, this enables the students to seek knowledge at their own pace regardless of timezone, location, or schedule.

Respondents have addressed the issue of shortened time for synchronous classes by instructing them to conduct experiments at home while recording. The respondents also mentioned that they only allow this for experiments that doesn't pose danger to students and with materials that they can easily access. Respondents also pointed out that this sudden change of how experiments are performed provide students an opportunity to be more creative.

Actual presentation or recorded experiment both provide the same result to students learning (Oguz-Unver & Yurumezoglu, 2010).

"Nag provide lang kog experiment nga mabuhat lang sa balay and then mag record lang sila doing that experiment".- Respondent 5

With the limited control of teachers during online classes, finding an alternative has become a growing problem.

Teachers need to find a way to look for an alternative that gives lesser drawbacks. The call for an alternative has been loud especially in the field of science where experiments are needed for some topics.

Respondents from this study revealed that they used multimedia as an aid for experiments. The safety of the students and the cost of materials have forced them to use simulations, videos, or generally known as moving pictures or multimedia.

"Ako lang gibuhat, naa koy gipakita na experiment sa youtube and then naa ra koy ihatag na questions and ang ilang answers mao lang to akong basehan kung nakasabot ba sila sa video and unsa bay results sa experiment." - Respondent 5

It is widely discussed in variety of books that learners remember 10% of what they hear and 20% of what they read. These percentages increase in multiples of 10 as the learners get involved in computer and simulation integrated activities (Barnes 2001; Buehler et al.2001; Chen et al. 2007; Krain & Lantis 2006). Not the most ideal but considering the situation we're in, using this is the best alternative. Aside from the stated advantages, moving pictures or multimedia is also accessible. In today's digital age, students can access learning resources at their convenience (Richter and Mcperson, 2012).

We're not actually new to this. In fact, flipped classroom which showed positive results rely on videos. There are two key components for a flip classroom: lectures should be moved outside through the use of electronic means and homework should be moved into the classroom in return (Educause, 2012). Flipped classroom model showed great results on student's learning (Cagande and Jugar, 2018). Despite the potential it has shown, there are still limitations to it. The unavailability of some

experiments in video file format tops among the list of possible limitations.

One respondent mentioned that sometimes, she takes matters into her own hands. She records herself conducting experiments and sends it to her students for them to watch.

"Usahay akoy mag video na nag experiment and ako lang ipatan aw nila nya naa lay questions" – Respondent 5

Video recordings have been considered as an excellent way to increase teacher's desire to improve their practice, and majority of them declared it as beneficial for self-assessment processes (Tripp & Rich 2012).Video recordings for experiments done by teachers themselves not only serve as an alternative for students learning but also helps teachers assess their abilities.

Communication between teachers and students have become a major concern during this new set up. This keeps some teachers hesitant to conduct group research or activities. A key factor for the success of group activities or projects is good communication between its members (Hoegl & Gemuenden, 2001). Respondents have mentioned that there are some topics where student's learning might be compromised if they won't conduct group research or activities.

One respondent mentioned that some topics in Earth Science needs actual exposure outside for deeper understanding.

"As per experience we were able to do case study like Earth Science. Students were able actually do case studies, they actually work together. I would give the students the topic, they are to research and have deeper understanding and report it with their classmates." – Respondent 4

Aside from communication, another issue that teachers need to deal with using group research is how to make sure that every member is not just contributing but also working collaboratively with the group. Teachers should teach students how to work with groups effectively (Burke, 2011). To identify if they're working proactively with groups, monitoring should be done by teachers.

One respondent mentioned that he usually asked students for an update on the status of their outputs.

"Despite the time that we have, on the current context that we are in, I really try to dip my finger on the things that they do. Actually hands on, I would communicate with them. For example, what are the updates, I continuously ask for updates or give a certain schedule to ask for updates on what they are able to reach or what are the things they have accomplished. If students have a hard time reaching out to one member, I usually reach out to them to make sure that everyone contribute to accomplish the bigger task."

– Respondent 4

Another effective method to help groups succeed is to require them to have an action plan (Davis, 1993). Action plan or plan of action basically includes giving of role assignment and possible measures to achieve a certain goal.

Fourth respondent mentioned that he usually ask groups for a plan before he allows them to proceed with the task. He also frequently ask for an update and an evaluation done by

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their other members of the group to determine if they really contributed. Each member has to rate and evaluate their group mates.

"For example, there's a big task, you partition the big tasks into three big stages, at the end of every stages I would ask for updates and then, after I would ask for evaluation and assessment of their members work." – Respondent 4

In the present, application of technology in education has become duller as educators try to cater the needs of millennial students who have grown with technology at their disposal (Clark & Mayer, 2007).

Even though we are in the era of technology and now facing a greater shift of pedagogy especially in an online setup, there's still the integration of collaborative practices that the teachers have used in a face to face to virtual learning.

Respondents have mentioned that they still use or apply some practices from face-to-face despite the major differences between the mentioned set ups.

"Sa amoang motivation. Before we start naa jud na siya perme and then our guided practice. Our school encourage us nga naa jud na ang guided practice." – Respondent 5

Several studies from the past have shown consistent positive results in using guided practice in both small and large group instruction (Anderson et al., 1979; Good, Grouws & Ebmeier, 1983).

Despite the major differences between the two set ups, they still share common characteristics where practices can still be effectively applied.

According to National Education Association (2001), whether the classroom is physical or electronic one, a good teaching practice will always be a good teaching practice.

5. Conclusion

Teachers have variety of practices they apply for certain situations. Safety of the students, finding the best alternative practices, and making sure that they can still work collaboratively have become the teacher's main focus for this school year. Few adjustments with their practices were made and some totally reconstructed it to fit with the needs and capabilities of students. With this new learning set up, teachers have demonstrated creativity and adaptability.

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