Micro-Teaching Lesson Plan

Affective Domain of Learning is Given Equal Importance as Other Domains in Teaching Charge Interactions

Teacher (name of student): Mike Angelo A. Aloba **Date assigned:** 05/06/2022

Rationale of the Microteaching Lesson (synthesis activity):

Challenges and Problems in Teaching Physics Courses

Physics is one of the most fundamental sciences as it encompasses many fields from biology to engineering. However, local studies here in the Philippines have shown that students' achievement towards Physics is low and it is not a surprising thing. Orlean (2007) have shown that there are many challenges and difficulties contributing to low student achievement of students in Physics ranging from lack of competent teachers to lack of appropriate and modern pedagogies. Due to this, the researcher was inspired to identify the specific challenges and problems in teaching Physics to students. Five of these challenges will be tackled in this synthesis paper.

Lack of qualified and quality training for Physics teachers. Teachers, as facilitators of learning, are important in the learning process. In a study by Orleans (2007), he found out that only one-third of his teacher-respondents were qualified to teach secondary Physics. This was seconded by the survey conducted by Philippine DOST as cited by Orleans (2007) which showed that there was a shortage of teachers who majored in Physics. In terms of attendance at professional development activities, the study of Orleans (2007) also suggested that most of the teachers were not able to participate in relevant training and seminars since they were not given opportunity to learn with adept Physics mentors in the Philippines. Unsurprisingly, Filipino students perform badly in international assessment just like in PISA 2018 which revealed Filipino learners' scientific and mathematical ability falls below the average world standard. The recommended solution to this as mentioned by Orleans (2007) is direct to the point, although it was not easy. The first one is that the teachers should attend training sessions that focus more on learning complicated Physics content. Also, the teacher should continue to learn and improve independently in case that there is no available training provided for them. In connection to that, DepEd should create linkages between Philippine universities to make affordable, conducive, and fruitful programs for Physics teachers. Lastly, the government should incentivize those teachers who are pursuing postgraduate degrees so as to attract more professional development in the field of education (Orleans, 2007).

Lack of visualization materials and instruments in teaching Physics. The availability of instruments and visualization of the concepts in Physics are the ones of the most defining attributes of a successful Physics classroom. Students do hands-on work in order to visualize complicated Physics concepts. However, Physics instruments are too expensive and most of the schools lack the corresponding materials needed for hands-on experimentation. The lack of experimentation materials led to another problem which is the inability of students to visualize concepts due to the fact that they were not able to see the concepts working in the real-world which makes the learning process difficult. This is supported by the study of Diate and Mordeno (2021). Their research focuses on the perceived challenges of Mindanao Physics teachers in teaching the subject. Their study has shown that material insufficiency which leads to lack of visualization is the number one problem for Physics teachers. However, there are recommended solutions that can be implemented. The first one is the use of options like simulatory visuals, animated films, Filipino-friendly examples, and other online activities that can be a substitute to expensive hands-on instruments. The digitalization of teaching Physics can help students visualize the concepts even without actually doing the real and expensive setup. However, online Physics experiments and activities will not work until the facilitator promotes an innovative pedagogical method. In teaching, the teacher should consider veering away from traditional chalk-talk techniques and therefore, a teacher should consider utilizing the computer technology and media in carefully planning a rich learning experience.

Lack of real-life application of concepts in teaching Physics. It is a challenge to create Physics exercises relatable for the students. If the Physics concept is not relatable to the students, then they will not be able to learn it fully (Mirana, 2019). Some Physics concepts are very complicated and contain a very generalized idea which is not the actual case in real-world scenarios (Bernido & Carpio-Bernido, 2007). Real-life application of concepts is important for students to experience the topic emanating from the Physics activity. To address this concern, the creation of online or home-based experiment is a viable suggestion for activities that entail real-world explanation of tangible and intangible Physics concepts (McDermott, 2001 in Diate & Mordeno, 2021).

Students lack the literacy and numeracy skills required in learning Physics. Literacy includes reading and comprehension. Students should be able to read and comprehend in order to understand Physics problems, to construct sentences and to analyze the Physics queries. When students' reading and comprehension skills are low, they will not be able to maximize learning. In a local study conducted by Mirana (2019) to DepEd secondary schools in Camarines Sur, Philippines, it was shown that 246 out of 256 students or 91.6% have a very low mastery and literacy in terms of Physics content. This implies that the majority of the Physics students were not able to translate the problems to their own words which resulted in a low mark. Numeracy, on the other hand, includes understanding the basic arithmetic, problem solving process and the manipulation of formula and equation. On equation and formula manipulation, Diate & Mordeno (2021) concluded that it is a challenge for students to move or manipulate variables in a formula to get the desired equation depending on the type of question while some students know the formula but they get confused when the formatting of the question is changed. Generally, the process of coming up with a correct solution is an arduous task for Physics students. Suggested solution requires teachers to facilitate a math refresher at the start of the class to address numeracy issues of the students. The teacher should see to it that he will refresh the students' mind of the Math concepts involved and required to the topic to be discussed before delving into the Physics proper. On the other hand, to address the literacy concern, teachers should allocate extra time to simplify their wordings to discussion and questions (Mirana, 2019). They should make the instructions clear, and explain it to their students even to the point of walking outside the English language. Interestingly, Diate and Mordeno (2021) concluded that when questions are simplified into "Taglish", students come up with a correct solution and answer which means that the problem is not the word but the complicated English language itself.

Affective domain is least emphasized. There are a lot of learning theories that suggest that it is primordial for students to see the relevance of the lesson being taught or to make meaning of the content presented. Many Physics teachers focus more on the cognitive domain in learning Physics and not on the affective domain where students learn to apply, value, and appreciate the Physics concepts, theories, and laws presented to them (Ramma et al., 2017).

Physics education in the Philippines has been hounded with problems from lack of innovative Physics instruments, literacy, and numeracy concerns to ill-equipped teachers with poor pedagogical methods. The situation is obviously exacerbated with the current pandemic situation. Due to this, I am inspired to address the last issue which is the issue on the affective domain being the least emphasized. The 21st century is a century of digital natives and as a teacher especially during this pandemic, I should be exploring what students are fond of and that is online virtual technology and digitalization of Physics materials. I should see to it that I will use technology simulations as a pedagogical tool instead of being just a tool. When technology is utilized as a pedagogical tool, there will be an increase in the value of teaching and learning which will be reflected in the engagement and participation of the students. This in turn and hypothetically, will address the concern as the use of online media such as simulations and demonstration videos have a lot of potential for both learners and teachers as learning should never stop even on a pandemic.

These are only a few of the challenges that Physics teachers are facing. These gaps must be filled to assure quality Physics education in the Philippines. Further research in addressing issues and challenges in Physics education in the Philippines is recommended.

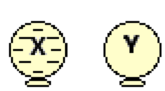
As a solution the last problem, Ramma et al. (2017) suggested that there should be a balance between the 3 domains of learning. Moreover, it is also recommended that technology integration should be fused with the affective domain. Possible strategies include the writing of technology-integrated reflection journals, essays and other learning activities or having a reflective discussion at the end/start of the lesson. For example, if the topic is about electric charges, the teacher may ask what the importance is of knowing electric charges. For the learners to appreciate the lesson, the teacher may cite examples like electric charges cause electricity which give us light, heat, and energy, then the teacher will fuse it with video simulations through the use and exposition of online or computer technology for the students to really visualize and appreciate the lesson.

Learning Objectives:

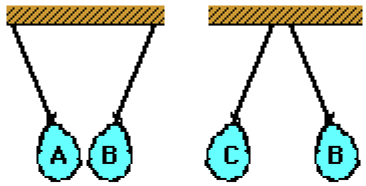
At the end of the lesson, the students should be able to:

a) List the types of electric charges (Psychomotor).
b) Describe the electrostatic force within electric charges (Affective).
c) Identify the three types of charge interactions due to electric force (Affective).
d) Determine the charge on an object based on the types of charge interactions (Cognitive).
e) Compose a short reflection on the importance of learning charge interactions (Psychomotor).

TIME	INSTRUCTIONAL SEQUENCE
0.5 min	**Opening the lesson:** The teacher will greet the students and will ask the students to keep everything that is not related to the class/lesson. Then, the teacher will check the attendance. After that, the teacher will do a brief recapitulation of the past lesson.
0.5 min	**Engagement and participation:** The activity is a pre-lesson assessment activity which is inspired from the mobile game "Four Pics, One Word" where four pictures describe the word that is being asked and presented. The major twist is that the students need to guess the jumbled letters of the word which is being pinpointed by the four clue pictures. The teacher will present two items that the student should answer within 10 seconds. The first student to give the correct answer will gain additional one point to the quiz after the lesson.
5 min	**Presentation:** From the previous grade levels, it is already known that different types of charges interact. Through this lesson, the teacher will teach how charges interact with each other within objects and how can they be used to predict the charge on an object from

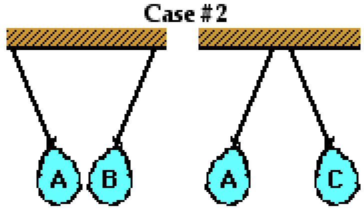
	observations of how it interacts with other charges. The teacher will first explain electric force also known as electrostatic force, that happens when charged objects interact with other objects to exert a force upon them even when held at a distance. The teacher will take note that the force mentioned can be either attractive or repulsive. Then, the teacher will explain electric force further by discussing the three rules of charge interaction. The first one describes those two objects with opposite type of charge will attract each other. The second one describes those two objects with the same type of charge will repel each other. The third one describes that any charged object (either + or -) and a neutral object will attract. The teacher will now proceed to discussing the basis for interaction between charges, which is the Newton's Third Law. As stated by Newton's third law, forces come in pairs therefore, all electrostatic interactions or charge interactions result in a pair of equal strength, oppositely directed forces with one force on each object. After discussing the rules and the basis, the teacher will now show examples of problems and how to answer them. The teacher will now make a conclusion that there are two reasons why objects attract as explained by first and third rule of charge interactions. It can also be concluded that there is only one reason why objects would repel as stated by the second rule of charge interactions. Therefore, when repulsion is observed, we can make firmer and narrower conclusions regarding the charge of an object. Lastly, the teacher will then give one importance of understanding charge interactions.
0.5 min	**Evaluate Understanding/Assessment:** There will be a four-item quiz which integrates application of the lesson given some real-life situations. The students will identify the outcomes/impacts of the charge interaction in each situation. The quiz will be checked right after the students answer them then the students will take a picture of their answer and they will upload it in the Google Forms that will be provided by the teacher. Quiz: 1. Two objects are shown below. One is neutral and the other is negative. Object X will _____ object Y (1 point).  a. attract b. repel c. not affect d. cannot be determined 2-3. On two occasions, the following charge interactions between balloons A, B and C are observed. In each case, it is known that balloon B is charged negatively. Based on these observations, what can you conclusively confirm about the charge on balloon A and C for each situation (2 points).

Case #1



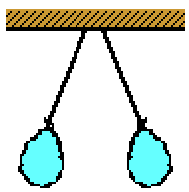
Object	Conclusive evidence to conclude the charge is +, − , neutral
A	
B	negative
C	

Case #2



Object	Conclusive evidence to conclude the charge is +, − , neutral
A	
B	negative
C	

4. Upon entering the room, you observe two balloons suspended from the ceiling. You notice that instead of hanging straight down vertically, the balloons seems to be repelling each other. You can conclusively say? (1 point)



a. both balloons have a negative charge.
b. both balloons have a positive charge.
c. one balloon is charge positively and the other negatively.
d. both balloons are charged with the same type of charge.

Answers:

1. (A). X is charged and Y is neutral. Charged and neutral objects always attract each other.

For items 2 and 3:
Case #1: (A) is either + or neutral; (C) is -
Since B is negative and observed attraction for it is a sign that A could have an opposite charge (+). However, A would also attract B if it were neutral. If C repels B, then you know for certain that it has the same type of charge as C - that is, a - charge.
Case #2: (A) is + and (C) is +
Tentatively, one could conclude from the A-B attraction that A is either + or neutral. Yet, seeing A repel C could lead one to conclude that A is NOT neutral; A must be charged with a + charge. Since A and C repel, one can conclude that C is also +.

4. (D). Observing a repulsive interaction is sufficient evidence to conclude that both balloons are charged. However, further testing or additional information would be required to determine the type of charge the balloons have.

0.5 min	**Closing Activities/Summary:** The teacher will ask the students to orally summarize the lesson through enumerating the three rules on charge interaction and create a short reflection (1 sentence will do) to be submitted in the Google Forms that will be provided by the teacher. Students will also be encouraged to write down areas or parts of the lesson that they find difficult in the same Google Forms.

Resources/Instructional Materials Needed:

Laptop, Projector, Google Forms, ¼ sheet of pad paper

References:

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