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MICROCLASS: A PEDAGOGICAL INNOVATION FOR TEACHING-LEARNING PROCESS IN SCIENCE

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ABSTRACT

Purpose – Innovation is imperative to address a wide array of challenges in higher education. The term “microclass” is coined by the researcher to describe the division of a large class into smaller classes, which are handled by student facilitators who have undergone microteaching and performed similar teacher tasks to facilitate students, assessment, discussion, and feedback.

Methodology – This was an explorative study and employed the triangulation method (self-designed questionnaire, observation by teacher peers, and semi-structured interview) as well as thematic and descriptive analysis to evaluate the roles of the teacher and student

facilitators, level of engagement, and effectiveness of this innovation in the teaching-learning process for the subject, biology.

Findings – Data revealed that the role of the teacher and student facilitators concurred to work responsibly in a synergistic manner as implementers of microclass. The teacher, conducted microteaching, observed, supervised, consulted, and provided feedback to the student facilitators. The student facilitators acted as discussant, motivator, collaborator, coordinator, and executor of initiatives such as scaffolding and pair method throughout the duration and stages of the microclass, resulting in an organized classroom. Furthermore, the microclass was innovatively effective and improved student engagement in the teaching-learning process, which in turn developed soft skills among the students–leadership, commitment and discipline.

Significance – It assists science teachers in constructively engaging their students in learning science including boosting students' soft skills, essential for 21st-century skills education and thus warrants further investigation.

Keywords: Microclass, pedagogy, 21st century skills education, student engagement, soft skills, triangulation method.

INTRODUCTION

The education system is essential in the learning development of individuals to become holistic in knowledge, skills, and behavior. Academic institutions should rely on more viable scholastic pedagogy and approaches to improve outcomes that will address the challenges of a fast-changing world and an ever-expanding diversity of learners in the globalization of education. (Wiseman, 2012; Myers, 2013).

The development and progress in reading and writing skills, and problem-solving across fields of sciences to social disciplines are critical in learning and retention which are associated with cognitive ability (Hammond et al., 2020), and requires mastering large bodies of facts to lead better cognition (Roediger et al., 2011). The pedagogical content knowledge concept of Lee Shulman in 1986 provides a comprehensive model that shapes a new approach for educators to address these critical issues in the science domain of teaching, by taking more opportunities to innovate teaching techniques (Newsome

et al., 2019). Further, faculties, school officials, and researchers are encouraged to innovate from theories and approaches which are essential and significant to the education system to prepare learners and to consider their uniqueness to become more knowledgeable in life and career (Glisic & Favaro, 2018).

Furthermore, prioritizing inventive solutions may fulfill the primary mission of tertiary institutions. The school will become cost-efficient and have competent instructional operations (Serdyukov, 2017). Recent findings suggest better effectiveness when innovation is at the classroom level; that innovative educational systems generally have larger expenditures than non-innovative systems, but the problem with less innovative systems is that students are less satisfied (Organisation for Economic Co-operation and Development [OECD], 2014). In addition, the massive promotion of tertiary education creates an array of adjustments, challenges, and difficulties in delivering instruction. Quality education must not be compromised to bring about college educators' innovative pedagogy.

The study assessed only the level of student engagement and the effectiveness of retrieval practice related to the microclass activities and did not include a deductive inference assessment. This was the first implementation and is currently in its developmental stage. This study could help in the teaching and learning process of science topics to acquire basic knowledge, skills and to improve student engagement.

Theoretical and Conceptual Framework of the Study

The teacher, student, and curriculum are the fundamental elements of an effective classroom setting. However, the synergy of these elements basically depends on the technique of the teacher (Kelleci et al., 2018). In theory, the most adopted approach to attaining educational goals is social constructivism, advocated by Vygotsky (1978), who stressed that active learning occurs socially (Gunduz & Hursen, 2015). This approach embraces cooperative learning (Asiksoy & Ozdamli, 2017), group or peer learning, collaborative learning (Nielsen et al., 2018), and more to enable students to perform course work embedded in the curriculum, effectively. Moreover, microteaching is a technique by practitioners to develop teaching skills within a smaller group of students that involves planning, teaching, criticizing, replanning, reteaching, and re-criticizing (Ledger & Fischetti, 2020).

Figure 1

Visual Concept of Microclass Innovative Teaching

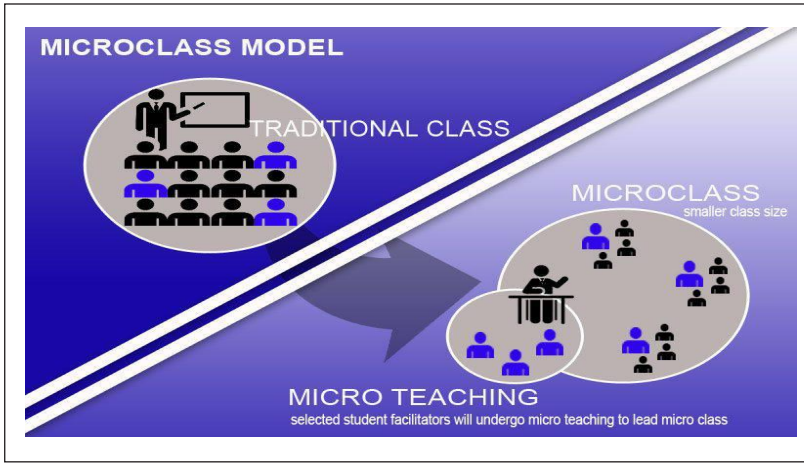

Figure 1 shows the visual concept of the microclass innovative pedagogy. This microclass is a combined concept of group/ collaborative learning and microteaching. There are limitations in collaborative approach including lack of cooperation, friendship, capacity level, and free-riding (Le et al., 2017). Furthermore, in peer learning, the person in charge of the group will facilitate dialogues for group forum activities (Chiu & Hew, 2018). In contrast, in the microclass concept, the leader will undergo microteaching. In the microteaching phase, the author prepared a quiz item for retrieval practice and introduced it to the student facilitators. The retrieval practice, or the mock assessment/practice tests or mini-quizzes except essays (Karpicke, 2017), forms the very heart of the microclass. The leader, who has undergone microteaching, will now be called a student facilitator, and each facilitator will be assigned to a group. Each group consists of four (4) students and an assigned student facilitator. Thus, the microclass is a large class divided into smaller classes handled by student facilitators doing retrieval practice. This is to address a recent report that the Philippines obtained the lowest rank in the global assessment for science achievements due to below proficiency results in PISA 2018 (DepEd, 2019) in Trends in International Mathematics and Science Study (TIMSS) (Mullis et al., 2019), which inevitably reflected students' performance at the college level.

The other goal of this microclass innovative concept was an attempt to address difficulties observed by the author in the context and based on similar observations by Lodge et al. (2018) who echoed in their integrative review that due to the increasing number of students in class, distracting social media or gadget activity, individual needs and differences add to difficulties of the instructor in providing improvement and feedback. Thus, in this concept, the student facilitator handles the feedback based on the results of the practice test or quiz provided with the answer key and helps to discuss the topic based on the questions. This also helps to determine students with capacity concerns in order to provide a report to the teacher (the author). Further, this helps to significantly address time management issues among working students as their time is largely spent on part-time work (Astudillo et al., 2019).

In general, the microclass has five basic steps: (1) fractionation is used to calculate the total number of groups and student facilitators; (2) microteaching among student facilitators; (3) retrieval practice; (4) reviewing and receiving feedback from student facilitators and members; (5) evaluation between student facilitators and teachers.

Statement of the Problem

The goal of this study was to evaluate the effectiveness of microclass innovative pedagogy in the teaching of science by specifically addressing the following questions:

1. How are the roles of the teacher and student facilitators conducted in the implementation of the microclass in the teaching and learning process?
2. What is the level of student engagement in the microclass?
3. How effective is the activity integrated into the microclass in the teaching-learning process?

RESEARCH METHODOLOGY

Research Design

This study adopted a mixed-method explorative sequential research design using the triangulation method (Creswell & Clark, 2017). The triangulation method is considered a process that uses multiple

perceptions to clarify meaning and verify the repeatability of observations or interpretations from interviews and questionnaires (Jentoft & Olsen, 2019). Qualitative data was used to describe the roles of the teacher and student facilitators, and quantitative data was used to evaluate the level of student engagement and effectiveness of the microclass activities.

Research Instrument

Researcher-made questionnaires with simple instructions were administered to students as one of the methods of data collection. A total of 10 indicators were contextualized to determine the level of engagement and the other 10 indicators to evaluate the effectiveness of microclass activities (AUSSE, 2011; Hart et al., 2011). Each of the indicators was answered using a 1 to 5 Likert scale (Schrum et al., 2020). The questionnaire was validated using the Lawshe test method with five panel members for content validity ratio (CVR), with a content validity index of 0.99 (Kipli & Khairani, 2020). The Cronbach's alpha was utilized for reliability to measure the internal consistency of responses (Adeniran, 2019). The teacher's observation guide questions consisted of the following: (1) Did this microclass meet your expectations, that the student facilitators were able to help other students in their learning process in the classroom? (2) How did you see the teacher's role in this approach? Could it be described as traditional, student-centred or subject-centred? (3) Was there student collaboration in the microclass? (4) Given that this approach was to complement self-directed learning, was it observable? (5) Could you suggest ways to improve on how the microclass could be conducted? Besides, there were six explorative questions (Montrieux et al., 2015) in the interview with student facilitators: (1) Was this microclass helpful in terms of time management? Did this microclass allow you to work together with your teacher and classmates? (3) Did you persuade your group members to complete the tasks? And how? (4) Did it provide encouragement to your classmates to answer and give appropriate feedback? (5) Besides following the teacher's instructions, did you take the initiative in conducting the microclass activities? (6) Is there anything you would like to say about the microclass procedure in the student learning process?

Sampling Design and Participants

Purposive sampling was used on the chosen participants because it was relevant to the study and reflected the characteristics of the

participants of the study (Krisdiana et al., 2019). The participants were first year Bachelor in Agricultural Technology (BAT) students of the academic year 2019–2020, the BAT 1 E section of Surigao del Norte State University (SNSU)- Mainit Campus in Magpayang, Mainit, Surigao del Norte with the coordinates of 9.53527778, 125.55805556. A total of 43 first-year students consented to participate in the study. Further, in the same class, the student facilitators were selected for the microclass based on recommendations of their classmates, spirit of volunteerism, and the author's choice. On the other hand, two teacher colleagues were purposely chosen to observe the microclass implementation because they are the dean and program chair of the teacher's education department and they could give better feedback because they have enough experience in the educational landscape. Teacher peer observation helps to evaluate colleague's undertakings in the classroom for development, and improvement in the teaching profession (Sarfraz, 2019) and to avoid cognitive bias in the study (Andrews et al., 2019).

Research Procedure and Data Collection

The concept of innovative teaching was presented to the research and development council of the SNSU and approved by the Board of Trustees, Director for Instructions, Program Chair of the Agriculture Department. The approved syllabus by the program chair of BAT for the first semester of Agricultural Biology (AGBIO 1) was used and served as a guide in the implementation. A letter of permission to gather data for the study was submitted and approved by the campus director.

The innovative teaching conducted was based on the author's microclass procedure as follows:

1. Draw up a student list. Get the total number of students in the class subject. Make small groups. Based on the student list, fractionate into several groups with a maximum of five students in each group. For example, if there are 45 students, create nine groups. However, if the total number of students is indivisible by five, then one group will have less than five students.
2. Selection of student facilitators. The total number of small groups form the basis for the total number of student facilitators required. Based on the example in step 1, select nine students to become facilitators for each group. For the selection of student

facilitators, you can do a background check in terms of who can be the best candidates for the job, based on recommendations by classmates, or select those who are willing.

3. Orientation of student facilitators. This is a proper invitation to the selected student facilitators. Orient them about the approach of the microclass and their tasks. Share with them the objectives of the approach: to help them and to help their classmates for the common good. After that, the student facilitators will undergo something akin to microteaching (later procedure).
4. Creating the microclass groups. Based on the example from steps 1 and 2, the 45 students have created nine groups including nine selected student facilitators i.e., 45-9 = 36. These 36 students will be grouped into nine groups, with each group having four students. Then assign a student facilitator to each group, i.e., 4 + 1 = 5, (four student members and one student facilitator), to set up the microclass groups, or microclasses. The importance of emphasizing the term, microclass is to distinguish it from the usual groups formed for some common group activity.
5. Microteaching. This is the most essential element in the microclass. The selected student facilitators must undergo microteaching. Prior to doing microteaching, consider the following: Preparation of the type of retrieval practices (quizzes, Q & A, true or false, key-words, etc.) appropriate for the topic. Print all materials for the student facilitators and students.
6. Task of the student facilitators. The student facilitators should be taught to do the following during microclass: (a) Describe the topic and the retrieval technique; (b) Discuss the mechanism of retrieval practice; (c) Encourage the facilitators to ensure that all the students do the tasks. (d) Encourage them to prevent cheating or copying to ensure the students' real learning. (e) The facilitators are allowed to take the initiative if they think it will be best to manage their respective groups well. (f) Facilitators must personally check the students' work, such as enumeration, spelling and answers, item-by-item or get students to exchange their papers and provide the answers.

Furthermore, qualitative data was first obtained from teacher peer observations during the actual implementation of the microclass using the guide questions mentioned. After that, the Socratic Method with six explorative questions were utilized for the semi-structured interview with 11 student facilitators. During the interview, the

researcher acted as moderator and recorded the answers while filling in the questionnaire after obtaining permission from the participants to record the interview for easy retrieval of neglected information. The validated researcher-made questionnaire was administered to 43 student participants to obtain data through focus group discussion upon answering the questionnaire together.

Scoring and Quantification of Data

The descriptive means of each indicator were referred to as the values in the ranges provided to define their respective corresponding verbal interpretation as shown in Table 1.

Table 1

Scale and Range with Their Corresponding Description and Verbal Interpretation

Scale	Range	Description	Verbal Interpretation	
			Student engagement	Microclass effectiveness
1	1.0 – 1.50	Strongly disagree	Very low	Least
2	1.51 – 2.50	Disagree	Low	Less
3	2.51 – 3.50	Neutral	Moderate	Moderately effective
4	3.51 - 4.50	Agree	High	Effective
5	4.51 – 5.0	Strongly agree	Very high	Very effective

Data Analysis

The researcher immersed himself in the data in order to become familiar with the information. A content analysis was performed: data gathered from the focus group interviews, teacher's observations, and questionnaires were organized, transcribed (in the case of the focus group interviews), segmented, and coded. From the various codes, themes or categories were established inductively to facilitate the interpretation and presentation of findings. Statistical treatment was done through SPPS v.16, which generated descriptive results for the mean and weighted mean of the responses from the questionnaires. The verbal description and interpretation were used to interpret the results of each indicator of student engagement and effectiveness.

RESULTS AND DISCUSSION

The identification and development of the themes were guided by the aims and questions of the study. To ensure the principle of confidentiality was executed systematically, the two teacher peers were coded as T1 and T2. Then, the 11 student facilitators were coded as SF1, SF2, SF3, SF4, SF5, SF6, SF7, SF8, SF9, SF10, and SF11. The names of students mentioned by the student facilitators during the interview, were also coded based on each student's number as indicated in the class record (e.g., SN 1).

Problem 1. How are the roles of the teacher and student facilitators conducted in the implementation of the microclass in the teaching and learning process?

According to Keiler (2018), reforming the educational environment for teaching and learning may change teacher sameness and make the most of success, especially when an educator designs an effective student-centered classroom. The roles of the teacher and students were thematically analyzed and presented in Table 2.

Table 2

Thematic Analysis of the Teacher and Student Facilitators

Microclass Implementer	Role
1. Teacher	**Before Microclass:** *Conduct a briefing to student facilitators.* *Provide instructions on how materials are to be used.* *Distribute learning materials.* *Lecture topic for microclass.* **During Microclass** *Observe.* *Supervise.* *Mentor.* **After Microclass** *Collect materials and output from student facilitators.* *Conduct post evaluation.* *Give feedback.*

(continued)

Microclass Implementer	Role
2. Student Facilitators	**Before Microclass:** *Participate in microteaching.* *Remind their group mates of scheduled microclass.* **During Microclass** *Act as discussant and activity coordinator.* *Ensure collaborative participation.* *Motivate members to finish task.* *Encourage members to focus on activity.* *Coordinate with teacher.* *Provide alternative ways or take the initiative.* **After Microclass** *Provide feedback to teacher.* *Address queries and provide clarification.* *Soft skills development*

As shown in Table 2, there are two implementers in this microclass, the teacher and the student facilitators. Each implementer's role is further classified into three stages of implementation: before, during, and after microclass.

Role of the Teacher

Before microclass

At this stage the teacher conducts a briefing to student facilitators on the nature and type of activities. Instruct them on how and when materials are to be used, the sequence, mechanics of the activity, including when to provide or seek the answer key to the activity from the teacher. The teacher also encourages using other resources like the Merriam-Webster dictionary and the internet if they have access to them aside from handouts. This was confirmed by the student facilitators, as they stated:

> "It is overwhelming as a leader that I can easily understand because it was explained to me during microteaching." *SF4*

> "It is now organized unlike before and we can focus because only us facilitators first to know how." *SF7*

> "Because we are taught in microteaching, it is beneficial to have the impression that you know more than they do." *SF9*

> "I could teach others about what you taught us in microteaching." *SF10*

During microclass

The teacher's role is to instruct the whole class to proceed with their microclass groups and that they need to listen to their facilitator and encourage them to cooperate. While the students are working, the teacher will act as an observer, supervise and check work in progress in a group-by-group manner. The teacher further acts as a mentor for each group every time the student facilitator calls for the teacher's attention when he/she is incapacitated to discuss the concept in depth, and every time they seek permission to modify or to give suggestions—if they try to change the steps or mechanics of the activities, if they find it good or not. These were affirmed by observations from the teacher's peers:

> "The role of the teacher is to only give instructions to the whole class." *T1*

> "The teacher sees to it that his students are actively participating in the tasks given, and does his part, like reminding them to review and check the progress of their work, and monitor." *T2*

After microclass

The teacher's role here is to conduct post-evaluation by soliciting comments from actual encounters of the student facilitators. Then the teacher will provide feedback and observations for their improvement including double-check their work.

Figure 2

Actual Images Taken during Orientation and Microteaching by Student Facilitators

This design does not disregard the traditional authoritative role of teachers, but rather a shift in role to being active facilitators in the classroom (Zabeli et al., 2018). The quality of a teacher depends on his/her knowledge of the subject content and how to teach the content termed as pedagogical content knowledge (PCK) (Kulgemeyer & Riese, 2018).

The present study on innovative teaching has demonstrated student centeredness and the role of the teacher as facilitator in the microclass. An innovative educator strives to find new ways irrespective of whether there is technology to keep students on task and to do their best (Tait & Faulkner, 2018). Innovative teaching has a significant impact under circumstances related to student diversity, and origin (Naz & Murad, 2017).

Role of Student Facilitators

Before microclass

The role of the student facilitators is to participate in the microteaching (Figure 2) and they are responsible for reminding their members (students) to bring handouts, materials and not to be absent for class. They have to prepare their lessons by studying in advance. This was stated by a student facilitator as follows,

> "I reminded them to memorize the parts, and since it was before the microclass, I reminded them to familiarize themselves so that we could easily finish the microclass." *SF3*

During microclass

The roles of the student facilitators in some of the actual images as seen in Figure 3 were summarized in the following themes:

Figure 3

Selected actual images depicting the various roles of student facilitators during microclass. Student facilitators as indicated by arrows. a) SF5 during a class discussion on the external parts of a frog. b) SF8 facilitating in a true or false retrieval practice. c) SF3 showing a plant sample using Q & A in a class discussion. d) SF10 during her tutorial discussion with two other members who left microclass to finish their tasks.

Discussant: He/she takes part in a formal discussion on the ideas of a topic during checking of students' activities, corrects their spelling, and discusses answers for the activity. This was strongly affirmed by a student facilitator:

> "The last time that SN 1 and SN 4 had a hard time understanding and finishing, even though I gave them

> the clue, so I need to discuss with them again and we are the only three left in the activity." *SF10* (Figure 2, d)
>
> "When someone is cheating or copying answers, I will have a direct discussion with him or her." *SF7*
>
> "I asked them if they understood, if not, I will explain to them again." *SF11*

Motivator: Encourage their members to finish the tasks and provide clear instructions in a step-by-step manner to achieve clear learning objectives. The other student facilitator stated that they motivated the students by reminding them that it was for their own good to learn and not to fail. Difficulty to perform the tasks can be overcome by reviewing the instructions, and repeating the discussion of the concept.

Collaborator: The student facilitators believed that some of their members were considerably better or better than themselves, and they admitted their limitations in terms of ability and needs. All of them responded in the interview that they worked together, shared ideas together to minimize mistakes and even planned together how to make tasks easier. The student facilitators listened to the ideas from their members when they suggested better ideas.

> "*Yes, there is interaction like questioning and some writing the answers and the student facilitator acting as a leader." T1*
>
> *"Yes, it was observed that there was collaboration that the group was discussing their ideas." T2*

Initiator: Due to unpredictable situations, they could modify or initiate other techniques not only to complete tasks. There were three themes extracted from the interview in terms of the student facilitators' initiative in giving their best for the group members in their learning.

First - Pairing method:

After some time of conducting the microclass, the student facilitators were able to identify potential classmates with intellectual capacity who could also teach or tutor other members within their group thus making the work of conducting activities easier. One way was by

pairing a slow learner with a fast learner so that the facilitator could focus on others to optimize class time as much as possible.

> "When I explained the topic to them, SN7 had difficulty understanding, so since SN20 has the capacity, I will assign SN7 to her and focus on SN26, who also found the topic difficult to understand." *SF4*

> "When there is an individual activity, I pair them to hasten the work." *SF11*

Second - They provide alternative mechanism:

For example, the teacher's instruction for an activity was for the students to raise their hands while their eyes were closed to avoid copying, but the eyes of some students were half-closed to get a hint or to copy answers, and in some instances, they imitated other answers during oral retrieval practice or quizzes. Some facilitators admitted such as acts like reordering the questions (*SF1*), handwritten rather than oral (*SF7 & SF8*), and whispered to me *(SF).*

Third - Scaffolding approach:

There were instances when the students could hardly give answers, causing delays in the output and making tasks more time-consuming. One way was to allow them to copy or share answers but to get them to finish the rest on their own. Accordingly, the facilitators made sure that the answers were discussed with the students.

> "Even you try to discuss with them several times, I allow them to see my answers and/or share how I do it to avoid wasting time, I need to double-check if it is right." *SF6*

Coordinator: They will coordinate when they feel uncomfortable with the discussion, if there are questions, or clarification raised by the members, and when there are members who are not responsive and need restraint. All student facilitators admitted that they work together with the teachers, when they collectively agreed that:

> "We lighten your work, sir because we also supervise our classmates and we are here to let them understand better instead of you."

After microclass

The student facilitators will submit all the output to the teacher, provide feedback to the teacher, and ask for queries and clarification about the approaches used. However, this stage also incorporated evaluation into the microteaching/before microclass.

Soft Skills Development

The teacher inadvertently integrates values development among the student facilitators. They develop such values which can be summarized as leadership skills as four student facilitators (SF1, SF2, SF3, SF4) admitted that it was their first time leading a group and they showed commitment in teaching others besides inspiring, disciplining, organizing, and helping minds as one of them said:

> "I encouraged him to come to class because he had an obligation to teach and it was his first time becoming a leader and he was inspired, unlike before in his previous school, where he continued to cut classes due to a feeling of unfairness and unhappiness in class." *SF1*

> "This is my first time being a leader, not only to lead but to teach, which inspires me." *SF2*

> "I was hesitant to lead, despite my previous experience as a leader, but these opportunities allow me to guide them and boost my confidence in leading." *SF 8*

> "It is very different that you, sir, will teach the whole class because sometimes it brings confusion and disorder or nuisance when your students know the answer, they will answer in chorus or in a jokey manner. In this way, it is better to teach a smaller number of students, which in turn minimizes disturbance in class." *SF4*

> "This is my first-time encountering this approach. This makes the classroom organized and disciplined because, before I always shouted at them to keep quiet when they know the answers and not to answer in chorus, because it's very disturbing. But because of this microclass, we can focus and we are organized and remove jokes or unnecessary noise in the classroom." *SF 9*

The study found that when the instructor acted as facilitator in the learning process of the students it helped to unlock and develop their full potential. At the same time, the students can also act as facilitators for their classmates for a greater learning experience encompassing cognitive, affective and skills. The findings of this study reflected the two tasks of 21st-century educators: (1) recognizing that students have similar skills and qualities with teachers, such as inspiring, advising, supporting, and offering a listening ear to their friends and classmates, and that they have the potential to harness and develop these assets in order to help students work in complementary ways alongside their instructors (Hampson et al., 2017). (2) promote critical thinking, creativity, innovation, adaptability, collaboration, communication (both written and oral), self-direction, self-assessment, and the application of technology to workflow (Oliver, 2016). Thus, sound moral values serve an important role in developing good manners (Akerlof, 2017).

Problem 2. What is the level of student engagement in the microclass?

Student engagement refers to the students' participation and lively involvement in classroom pedagogy (Dayagbil et.al., 2018). The positive indicators were sequenced in odd numbers as presented in Table 3 and all negative indicators were sequenced in even numbers as presented in Table 4. As shown in Table 3, indicator one (1) had the highest weighted mean of 4.53 which was very high.

Table 3

The Weighted Mean Distribution of the Positive Indicators on Student Engagement

Indicator	Weighted mean	Verbal Description	Interpretation
1. It improves my participation through group discussion.	4.53	Strongly agree	Very high
3. Learning together effectively helps me to understand the core lessons.	4.37	Agree	High
5. I am confident to give my answers.	4.00	Agree	High

(continued)

Indicator	Weighted mean	Verbal Description	Interpretation
7. The activity allows for the expression of personal views.	3.72	Agree	High
9. I can help others to accomplish tasks promptly.	4.23	Agree	High
General Weighted Mean	4.17	Agree	High

This implies that an opportunity for group discussion in a microclass improves student participation, which was strongly agreed by respondents resulting in a high level of engagement, as it involved the opportunity to learn together, express personal views, and encourage confidence building that eventually lead to accomplishment of the tasks. This was confirmed by the teacher's peers:

> *"Yes, members of each group observed that they asked the facilitator relevant questions." T1*

> *"Yes, the student facilitator checks the work of his/her group mates and encourages them to discuss." T2*

Table 4 shows disagreement that the level of student engagement in this innovative pedagogy was low. According to Stroud (2014), sustaining the amusement of learning should always be necessary and painstakingly equal. The activities in the microclass provided wide and equal opportunities among students to become active, comfortable, even to receive correction and clarification of ideas enhancing their communication skills. This innovation is similar to the problem-based learning method, in which students are actively involved in class work and given adequate time to work on relevant lesson-related tasks (Delialioglu, 2012), working hand in hand with student leaders or friends, talk about their needs and accept one another's ideas to create a constructive community or, surroundings (Allen et al., 2011).

Table 4

The Weighted Mean Distribution of the Negative Indicators on Student Engagement

Indicator	Weighted mean	Verbal description	Interpretation
2. I am not actively involved in group activity.	1.72	Disagree	Low

(continued)

Indicator	Weighted mean	Verbal description	Interpretation
4. I am not comfortable with sharing my ideas.	2.16	Disagree	Low
6. It gives me no opportunity to ask questions which are not clear to me.	1.58	Disagree	Low
8. It does not help me to develop my communication skills through conversation.	1.49	Strongly disagree	Very low
10. I do not feel free to receive correction from others.	1.67	Disagree	Low
General Weighted Mean	**1.73**	**Disagree**	**Low**

Problem 3. How effective is the activity integrated into the microclass in the teaching-learning process?

Innovative procedures in the learning process comprise a combination of transferable competencies like soft skills or emotional intelligence in the planned course undertaking (Dueñas et. al., 2016). The results of positive (odd) and negative (even) indicators are presented in Table 5 and Table 6, respectively.

Table 5

The Weighted Mean Distribution of Positive Indicators of Effectiveness of Microclass Activities

Indicator	Weighted mean	Verbal description	Interpretation
1. The microclass gives me time to review my lessons and not only during examinations.	4.47	Agree	Effective
3. The retrieval practices are helpful to gain knowledge.	4.4	Agree	Effective
5. It provides appropriate materials useful for individual learning.	4.53	Strongly agree	Very effective

(continued)

Indicator	Weighted mean	Verbal description	Interpretation
7. It makes use of several resources to guide learners in providing correct answers.	3.88	Agree	Effective
9. The task provided is challenging.	4.41	Agree	Effective
General Weighted Mean	**4.33**	**Agree**	**Effective**

Table 5 shows that the respondents agreed on the positive indicators, except for indicator five (5), which was strongly agree. This study found that it is more challenging and encourages learners to complete their task individually when the learning activity and materials are given. The microclass serves as a place and time for the students to review their lessons and acquire basic knowledge through retrieval practices. SF3 stated during the interview which was agreed by all student facilitators and affirmed by SF1 and SF10 that:

> "It does not steal time from other subjects because you allot time for review of our learning in this biology subject; unlike other subjects where you catch us answering other requirements not related to your subject during your class time." *SF3*

> "It is helpful because we have time in biology to review or do mock assessment; retrieval practice is appropriate only in your time and, in return, our vacant or other time focus on other subjects." *SF1*

> "It's just a little time we can allocate to biology, it will not consume more time to study because we have time to review in that way; also, I can do the other work with other subjects since I am a working student." *SF10*

Moreover, Table 6 shows that the respondents disagreed with all the negative indicators—that generally, the microclass activities were less effective.

Table 6

The Weighted Mean Distribution of Negative Indicators of Effectiveness of Microclass Activities

Indicator	Weighted mean	Verbal description	Interpretation
12. It is not helpful in my literacy skills.	1.76	Disagree	Less
14. There is no immediate feedback that helps to correct error in storing wrong information.	2.1	Disagree	Less
16. The activity in the microclass is boring.	1.76	Disagree	Less
18. The microclass provides no opportunities for discussions that help us to work with my classmates.	1.76	Disagree	Less
20. Activities provided in the microclass were not attainable within the given time.	1.59	Disagree	Less
General Weighted Mean	**1.79**	**Disagree**	**Less**

In general, microclass activities that incorporate retrieval practices will serve as additional evidence to the claims by Moreira et al. (2019) that retrieval practices appear to be a helpful way to maximize learning acquisition in classroom settings, however there is lack of available evidence. The microclass activities help develop writing and reading skills in biological terms. This finding was supported by the student facilitator, when he said:

> "We also help to correct the spelling together because biological terms are sometimes difficult to read." *SF11*

Furthermore, similar to the intention of place-based inventive solutions in teaching, it creates an enormous goal for student's experiential learning (Holden & Sykes, 2011). By incorporating active learning (Liu et al., 2020), and creating a space for innovation, learners become more mature, take on calculated risks, and are confident in learning at their own pace, leading to increased student engagement (Shulman, 2018). Allowing students to be in unpredictable situations and/or giving them similar opportunities to work collaboratively with active

groups undoubtedly help them prepare for future work (Theobald et al., 2017).

CONCLUSION

Based on the study's findings, this microclass innovation expands on the roles of the teacher and student facilitators. They can act as both implementers and consumers of the process, enabling the planned work, and the expected outcome to be attainable. Their roles, however, differ at each stage of the microclass: before, during, and after. The teacher is responsible for microteaching, which includes briefing the chosen student facilitators, providing instruction on how learning materials are to be used, distributing materials, and delivering answers to topics; at the same time, the student facilitators join in the microteaching before the microclass stage. During microclass, the teacher's role is to act as an observer, supervisor, and consultant, while the student facilitator's role is to act as discussant, motivator, collaborator, coordinator, and takes the initiative in scaffolding and pair method. After microclass, the teacher and student facilitators meet for feedback. In general, the roles of the teacher and student facilitators synergize to attain success in various activities in a well-organized classroom.

Furthermore, the fractionation of the large class into smaller classes, called microclasses, helps for better student-student interaction and makes the class manageable. There is positive participation and active enthusiasm in small group learning. Though the concept is similar to group learning, what makes it different is the conversion of the traditional group leader into a student facilitator who has a similar function as the teacher. This validates the idea that the student can work together with the teacher. They can work the same with our work, but the active presence of the teacher in the learning process subdues the limitations of the student facilitator. This retrieval-based learning is qualitatively proven to contribute to the effectiveness of engagement, rather than to the retention of knowledge which was not measured in this study. However, it is also acknowledged that this microclass and its embedded retrieval practices contribute to academic performance.

This implies that you can unlock the potential of the learners and empower them by working with them and in turn, they help you as

a teacher to diagnose what they need and the feedback they require, especially in learning science. This low-cost microclass innovative teaching improves students' participation, collaboration, and interaction in helping one another to complete tasks, resulting in high student engagement. Besides, the microclass is innovatively effective and instills soft skills among students which include leadership, commitment, discipline, and helping minds for life skills development.

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