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Teachers and Students Perceptions on the Inclusion of Scientific Practices in the Division-Initiated Science Learning Activity Sheets (LAS)

Anjie Tomnob Beduya, MaEd, Joy Borbano Saldana, EdD
Schools Division of Calbayog City, Philippines

Abstract. This study determined the scientific practices in the division-initiated Science Learning Activity Sheets (LAS) as perceived by secondary Science teachers and their students in the Schools Division of Calbayog City, Philippines, school year 2021-2022.

Descriptive-correlational research with a questionnaire distributed to the 56 secondary Science teachers and 367 students was employed. The questionnaire compared the perceptions of the two-groups of respondents on the inclusion of scientific practices in the division-initiated Science Learning Activity Sheets (LAS) in terms of (a) asking questions; (b) developing and using models; (c) planning and carrying out investigations; (d) analyzing and interpreting data; (e) using mathematics and computational thinking; (f) constructing explanations; (g) engaging in argument from evidence; and (h) obtaining, evaluating, and communicating information.

The finding of the study revealed that the teachers and students agreed that the division-initiated Science Learning Activity Sheets (LAS) employed the different scientific practices. Further, the study also revealed that there is no significant difference in the perceptions of the two-groups of respondents on scientific practices. Thus, improvement of scientific practices in the division-initiated Science LAS is decidedly recommended and conceived.

Keywords: scientific practices, division-initiated Science Learning Activity sheets (SLAS), Self-Learning Module (SLM), new normal education, perceptions

Introduction

The COVID-19 pandemic has created unprecedented challenges across the globe. More than just a health crisis, it has resulted in an educational crisis. During lockdowns and quarantines, 87% of the world's student population was affected and 1.52 billion learners were out of school (UNESCO Learning Portal, 2020).

The Philippines, through its Department of Education (DepEd) together with other Southeast Asian education ministers, presented different education strategies in response to the COVID-19 global crisis during the first South East Asian Ministers of Education Organization (SEAMEO) Ministerial Policy e-Forum. Secretary Briones and the education ministers across the globe shared their education frameworks and innovations to frame the new normal education and laid out preparations for the opening of classes within their respective countries. Philippines, adapted modular systems to deliver education while prioritizing the safety of the learners (DepEd, 2020).

In response to the new normal education, the Schools Division of Calbayog City conducted "Division Convergence of Education Leaders (DCEL)" that focused on the discussions on the crafting of the School Learning Continuity Plan (SLCP) in lined with DepEd Order No. 12, s. 2020, "Adoption of the Basic Education Learning Continuity Plan for school Year 2020-2021 in the light of the Covid-19 Public Health Emergency". The consolidated report on the learner enrolment and survey forms from the enrolment helped the school administrators in crafting the SLCP to determine the best distance learning delivery modalities to be employed in their school.

Due to unforeseen challenges, the Self-Learning Modules (SLMs) developed by the DepEd Central Office was not utilized in the first quarter of school year 2020-2021. Hence, in lined to the Regional Memorandum No. 231 s.2020 which encourage the teachers to craft their own Budget of Lessons and Learning Activity Sheets (BOLAS), the Schools Division of

Calbayog issued a Division Memorandum No. 231 series of 2020 on Teacher's Preparation and Submission of Most Essential Learning Competencies (MELC)-based BOLLAS in all subject areas including Science to be used as a material for learning at home in the absence and unavailability of SLMs. Similarly, the division conducted "Division-District Based Re-echo on the development of Quality Assured Budget of Lesson & Learning Activity Sheet in Science". This is a series of training-workshops participated in by Science teachers on the crafting and development of the division-initiated LAS.

However, during the time of pandemic or even before the COVID 19 event, a large chunk of our science classes opted for rote learning instead of discovery learning. Most of the classes involved presentations of concepts and ideas only with little scientific practices presented because it's difficult and unreasonable to conduct considering the situation. With this scenario, the researchers wanted to determine if the division-initiated LAS in Science include and promote scientific practices.

Considering the modular distance modality employed, challenges encountered in modular distance learning modality such as time management, innovating teaching strategies, adapting to the changes brought by the pandemic, the implication of the utilization of the division-initiated Science LAS in equipping students with the necessary scientific practices, as well as the idea that science classes opted for rote learning instead of discovery learning wherein classes involved presentations of concepts and ideas only with little scientific practices presented because it's difficult and unreasonable to conduct considering the situation. this research is undertaken to compare teachers and students' perceptions whether scientific practices are included in the division-initiated LAS in Science utilized in Calbayog districts in the Schools Division of Calbayog City, Philippines school year 2021-2022. Therefore, this study is a vital measure to investigate whether the division-initiated Science LAS developed and utilized contain different scientific practices based on the framework of K to 12 Science Curriculum even during the pandemic situation

Related Studies

Minshew (2018) studied student-generated questions in inquiry Science connecting to collaborative argumentation that focused on two identified scientific practices: asking questions and engaging argument from evidence. The findings suggest that the type of student-generated questions influenced the number and the complexity of the instance of argumentation during each activity. Specifically, the inquiry content questions were identified as being more related to the dialogic argumentation than the other types of student-generated questions. Students frequently used questions to indicate points of confusion or to seek clarification of ideas and content material. Students also encouraged each other to explain their thinking as well as to provide more information about a given topic. Students' explanation did not always include evidence to support the initial claim; however, the explanations showed that students were capable of reasoning about Science content and expressing their understandings. Furthermore, the study demonstrated that students' questions are an important scientific practice and relate to the development of student argumentation skills. The interest of the cited study is related and works on the present study since both dealt with scientific practices based on the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (NRC, 2012). The study above focused on the two scientific practices specifically on asking questions and engaging argument from evidence in exploring the relationship between student generated-questions and dialogic argumentation that emerged naturally during collaborative group work. On the other hand, the present study focuses on the eight scientific practices namely: asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence and obtaining, evaluating, and communicating information. Further, the present study differs in the cited study because it focuses on the scientific practices in modular distance learning specifically in using the division-initiated secondary Science learning activity sheets.

Meanwhile, Mastro (2017), in a study on the claim, evidence, and reasoning: evaluation of the use of scientific practices to support argumentative writing in the middle school Science classroom, focuses on the specific science and engineering practice, “engage in argument from evidence”, and how classroom practices can serve to strengthen this skill. The summary findings of the study stated that through implementation of an inquiry-based model of argumentative writing instruction, students became better able to identify, critique, and compare the quality of evidence in written arguments. Through incorporating that evidence into their writing and critiquing the quality of this evidence in others’ writing, their ability to analyze and interpret evidence in other’s writing increased.

The aforementioned research is closely related to the present study, for it dealt on the scientific practices especially in engaging in argument from evidence. They also differ because the current study focus on the new normal set up – modular distance learning.

Oswald (2019) studied the four (4) scientific practices integrated in the literacy program (Reading Wonders) and investigated into whether or not general literacy instruction might be useful in developing science literacy. The study found out that these four scientific practices were present in the Reading Wonder but students were not fully engaged to do the practices. This study is related to the current study because both dealt with the scientific practices especially in asking questions, constructing explanations, engaging in argument from evidence; and obtaining, evaluating, and communicating information. However, the present study focuses on the eight scientific practices namely: asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence and obtaining, evaluating, and communicating information while Oswald focused only on four.

Consequently, Danipog (2018) studied assessing the scientific inquiry practices of teachers and investigating their relationship with student learning explored the nature of classroom instruction of teachers in the Philippines. Specifically, it examined whether teachers’ inquiry practices of engaging in questioning, designing and conducting investigations, collecting data, analyzing data, developing explanations, and communicating information were related to students’ chemistry achievement. Observations revealed that teachers enacted the six practices of scientific inquiry in varying degrees in their classrooms. They seemed to be more comfortable to enact the practices of engaging in questioning and communicating information than the practices of designing and conducting investigations, collecting data, analyzing data, and developing explanations in chemistry teaching. The study found that out of six scientific inquiry practices, only engaging in questioning showed a significant positive relationship with students’ chemistry achievement.

The aforementioned study is related to the current study because both dealt with the different scientific practices. And based on the result of the study, only one among the six scientific practices showed a significant positive relationship with students’ chemistry achievement. This finding will also help the current research if only one among the eight scientific practices or more are effective in meeting the competency in the division-initiated Science LAS. However, the number of the respondents and site of the study differs from the aforementioned and current study.

Hedenstrom (2019), on the study using the practices of Science in elementary schoolyard inquiry investigations has the goal to explore how elementary students engage with and make sense of the Practices of Science (PoS) when involved in authentic scientific investigations guided by student-generated questions. The analysis of the data showed that peer-to-peer discussion was central to inquiry pedagogy and learning and practicing the PoS for understanding Science. The students benefitted from models of PoS to both get familiarized with the PoS and later replicate those in their learning. A second finding suggested that peer-to-peer discussion promoted student engagement in scientific discourse. A third showed student engagement in the practices of asking authentic questions and defining problems and planning and carrying out investigations in familiar settings facilitated their introduction into scientific dispositions and habits of mind in all three settings. These findings are relevant for elementary Science teachers, Science educators, Science education researchers, curriculum writers, and administrators in improving students' skills and content knowledge in Science.

The aforementioned study is closely related to the current study because both dealt with the scientific practices. The findings showed the efficacy of using scientific practices in the classroom scenario in improving the scientific literacy of the students. However, the current study differs because the above study showed the effectiveness of the scientific practices in peer discussion or face to face situation while the current study is situated in a modular distance learning.

Ozalp (2014), on his study entitled: "Science Teachers' Understandings of Science Practices before and after the Participation in an Environmental Engineering Research Experiences for Teachers (RET) Program" stated that teachers who will engage learners in the different scientific practices should engage themselves in scientific practices first. The analysis also indicated that the teachers who actively engaged in the Science practices, had productive discussions with the graduate student mentors and participated the quick lessons they gave, read the literature for their research, used new techniques and methods, and participated in the research group meetings improved more on the abilities of the science practices compared to the teachers who did not have the opportunity to participate in the practices because of the structure of their projects, had low interest, and received most of the information directly from the graduate students. In addition, this study found out that the support in the research group and the engagement in the Science practices are very important to improve teachers' understandings of the Science practices. Therefore, it is important that the Science method courses and content courses for preservice teachers incorporate Science practices within their curriculum. They should place an emphasis on teachers' experience in epistemic communities that allows them to engage in all the practices and focus on learning what each practice mean.

The above mentioned study is closely related to the current study because both dealt with the scientific practices. However, they differ in terms of the respondents and site of the study.

Accordingly, Bowers (2019), on his study entitled: "Supporting Teacher and Student Competency with Scientific Practices through Lesson Study", developed a lesson study (LS) based professional learning (PL) program, which he implemented at a low socio-economic status (SES) school district to address the underlying deficiencies in teacher pedagogical design capacity (PDC) for practices. The results demonstrate that teacher PDC for the several scientific practices, particularly scientific modelling, argumentation, and communicating findings, increased due to the PL program. However, student argumentation competency and teacher self-efficacy remained stagnant, possibly due to the short timescale (1 year) of our intervention and the lack of support from upper-level administrators.

This study is related to the present study because both dealt with scientific practices. Bowers developed a program to address the underlying deficiencies in teacher pedagogical design capacity for practices and investigated the impact of this program especially on the following scientific practices: scientific modeling, argumentation, and communicating findings. However, the current study focuses on the eight scientific practices including asking questions, planning and carrying out investigation, analyzing and interpreting data, using Mathematics and computational thinking skills, constructing explanations.

Meanwhile, Brand (2020), on her study Integrating Science and Engineering Practices: Outcomes from a Collaborative Professional Development, stated that an interdisciplinary team, consisting of science education and mechanical engineering faculty and doctoral students from each discipline, and Science, Mathematics, and career and technical curriculum supervisors, collaborated with middle school technical education teachers to develop a framework for integrating engineering practices into their curricula. The findings highlight factors that motivated these teachers to reform their instructional practices, as well as their deliberations while endeavoring to assimilate the strategies into their curricular activities.

The abovementioned study is related to the current study because both dealt with the scientific practices. However, the studies differ in terms of their respondents because the former used the interdisciplinary team while the present study, the teachers and students are the respondents.

Likewise, Kim (2015) studied the effects of Science and Engineering practices on Science achievement and attitudes of diverse students including ELLs examines diverse elementary students including English Language Learners (ELLs)' Science achievements and attitude changes following inquiry-based activity experiences. The Science exploration sheet (SES), which measured the scientific achievement, showed that 92% of students answered their own questions using their individual scientific models. However, pre- and post-attitude surveys revealed that there was no significant change in students' attitudes about Science/scientists following the inquiry intervention ($p< .05$). Particularly participating teachers' views of inquiry teaching experiences to their ELLs were discussed.

This study is related to the present study because both dealt with the eight (8) scientific practices. However, the present study focuses in modular distance learning while the former is on actual class.

Blewitt (2020) studied high school Science teachers' beliefs and practices for scientific literacy during enactment of a citizen Science project. Results showed that the participating teachers aligned their beliefs with their practices and all of the participating teachers used socio-scientific issues in their classroom practice. Lastly, this study makes clear that citizen Science can be used as a vehicle for the teaching of scientific literacy. However, it is the beliefs and practices of the teacher using the citizen Science project that makes teaching scientific literacy in a reform-minded manner possible.

This study is related to the present study because both dealt with the scientific practices. However, both studies differ in terms of the number of respondents and methodology.

Christian, Kelly and Bugallo (2021), on their study of NGSS-based teacher professional development to implement engineering practices in STEM instruction concluded that the overarching research questions addressed how professional development in engineering education affected secondary STEM teachers' beliefs about the value of using engineering design to support learning, their self-efficacy regarding teaching engineering in their courses, perceived obstacles to effective STEM integration, and their confidence advising students about engineering post-secondary study and careers. The study above is related to the present study because both dealt with the scientific practices. Both dealt also about their beliefs in using these Science and engineering practices. However, the present study differs on the number of respondents.

Meanwhile, Gullapyan (2020) studied the best teaching practices to increase student interest in STEM subjects. As a result of this study and the findings from the literature review, the researcher developed an in-service training model regarding the best practices to increase student interest in STEM-related subjects. This model leads to the mastery of fundamental Mathematics and Science skills and concepts.

The study above is related to the present study because both dealt with the practices-scientific practices that helped students to develop mastery of fundamental Mathematics and Science skills and concepts. However, the present study differs the way it was conducted. It focuses on modular distance learning.

Topalsan (2020), on his study the development of scientific inquiry skills of science teaching through argument-focused virtual laboratory applications study designed within the scope of a TUBITAK 4005 project aimed to give science teachers training on argumentation-based learning, to provide them with scientific inquiry experience, to ensure that they gain skills to develop argumentation-based experimental learning methods. When all the obtained data were evaluated qualitatively and quantitatively, a statistically moderate effect was determined on the teachers' post-test scores from the "Opinion Scale for the Virtual Lab" and the "Principles of Scientific Inquiry Teacher." Also, the participating students and teachers mostly expressed positive views in the "Assessing Argumentation based Science Learning Activities- Scale" applied after the implementation phase. Teachers and students found opportunities for more systematic thinking on scientific knowledge developed through these materials and teachers' and students' abilities to ask research questions for the solution of a scientific problem have also improved through this research.

This study is related to the present study because both dealt with scientific practice especially in engaging in arguments from evidence. However, the present study focuses on the eight scientific practices including asking questions, planning and carrying out investigation, analyzing and interpreting data, using Mathematics and computational thinking skills, constructing explanations, developing and using models, and obtaining, evaluating, and communicating information and they differ in the number of respondents.

Likewise, Cira, Tas, and Yesiltas (2021), determined the effect of the GEMS program prepared according to the 6th grade "Force and Motion" unit on students' basic science process skills and attitudes towards the GEMS program. According to the research findings and the conclusions, it is seen that the level of basic Science process skills of the students who learned the 6th grade "Force and Motion" unit with GEMS activities which adapted to SEC are higher than the level of basic Science process skills of students who learned the same subject with Science curriculum based lesson. Students took an opportunity to act like a scientist and had a chance to use observation, measuring, classification, and data prediction in the implemented activities.

This study is related to the present study because both dealt with the scientific practices. However, the present study differs in terms of the number of the respondents.

Based on the study of Hadianto, Mudakir, and Asyiah (2018), the modules, which incorporate a variety of scientific approaches, improve students' performance in all areas, especially in Science. According to the findings of their research, students who learn using scientific practices have a higher average level of activity in their learning activities than students who learn through traditional methods. This only suggest that scientific approach is beneficial in the teaching-learning process.

This study is related to the present study because both dealt with scientific practices. However, the abovementioned study dealt with scientific practices in the modules while the present study deal with the scientific practices in Science learning activity sheets and the present study views the scientific approaches as scientific practices based on the National Research Council (2012).

The cited local and international research studies contributed to the present study for they dealt with the different scientific practices in terms of asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using Mathematics and computational thinking skills, constructing explanations, engaging in argument from evidence, and obtaining, evaluating, and communicating information. These several studies mentioned above have addressed to the implementation or integration of these scientific practices in the old normal setting of delivering instructions where teachers and students are in one classroom. The present study focuses on division-initiated secondary Science learning activity sheets with attention to scientific practices.

Study Objectives

This study compared the perceptions of teachers and their students on the inclusion of scientific practices in the division-initiated Science Learning Activity Sheets (LAS) in Calbayog districts of the Schools Division of Calbayog City, Philippines during the school year 2021-2022.

Specifically, the study sought to achieve the following objectives:

1. To determine the perceptions of the teachers and students on the scientific practices in the division-initiated Science LAS in terms of: (a) asking questions; (b) developing and using models; (c) planning and carrying out investigations; (d) analyzing and interpreting data; (e) using mathematics and computational thinking; (f) constructing explanations; (g) engaging in argument from evidence; and (h) obtaining, evaluating, and communicating information.

2. To identify the significant difference in the perceptions of the two-groups of respondents on the scientific practices in the division-initiated Science LAS.

3. To propose improvement on the division-initiated Science LAS based on the findings of the study.

Theoretical Framework

The research is anchored on John Dewey's Inquiry-Based Learning. Dewey proposed that Science should be taught as a process and way of thinking – not as a subject with facts to memorized.

Inquiry-based Learning (IBL) is an approach to teaching that nurtures student questioning, reasoning, and understanding. Keselman (2003) defines inquiry-based learning as an educational strategy in which students follow methods and practices similar to those of professional scientists in order to construct knowledge. It can be defined as a process of discovering new causal relations, with the learner formulating hypothesis and testing them by conducting experiments and /or making observations (Pedaste, Maeots, Leijen, & Sarapuu, 2012). They often viewed it as an approach to solving problems and involves the application of several problem solving skills. It emphasizes active participation and learners' responsibility for discovering knowledge that is new to the learner (de Jong & van Joolingen, 1998).

Rubba and Andersen (1978), Hurd (1970) and Klopfer (1971), support inquiry-based learning by indicating that the major goal of Science education should be developing students "scientific literacy". Since the goal of Science education is related to very important questions which are "why teach Science to who teach Science and at what level", there is a relationship between the method of instruction and the attainment of objectives (Baez, 1971). Among these different kinds of methodologies, inquiry method has an important place. The inquiry-based teaching approach is supported on knowledge about the learning process that has emerged from research (Bransford, Brown, & Cocking, 2000).

In this sense, inquiry-based Science involves scientific practices where students doing science especially in their learning activity sheets where they have opportunities to explore possible solutions, develop explanations for the phenomena under investigation, elaborate on concepts and processes, and evaluate or assess their understandings in the light of available evidence.

Therefore, Science will never be Science in teaching concepts and skills using the learning activity sheets if scientific practices are not taking into account. As mentioned by Ford (2015) that education aims for the use of science learning activities with engagement in scientific practices. These scientific practices are the key to value abilities, to understand the meaning of Science and performances.

The above-mentioned theory provides anchorage to the current study because it gives ideas in using inquiry-oriented approaches especially that students are using the division-initiated learning activity sheets to effectively learn and understand their content tasks and activities especially in Science. It demonstrates how students may quickly grasp and learn the concepts and abilities specified in the learning objectives. For easy and quick understanding, it highlighted numerous things that teachers and students should consider when undertaking the various tasks and exercises featured in their Science LAS. This is because the idea explains and highlights that students learn more when they are fully involved in the task and exercises offered to them. It is also anchored to the current study by demonstrating all scientific practices to be consider when creating and designing activities and tasks in order for the students to fully understand the concepts and improve scientific literacy.

As a result, inclusion of scientific practices in division-initiated Science LAS helps students form an understanding of the crosscutting concepts and disciplinary ideas of Science. Moreover, it makes students’ knowledge more meaningful and embeds it more deeply into their views. On the other hand, teachers need to experience scientific practices as learners themselves before they become able to implement those in their instruction. With this goal, as a departure point, Science class in the new normal education should be designed in ways that present and support scientific practices while paying emphasis on inquiry-based learning.

Conceptual Framework

Figure 1 depicts the flow of the study as well as the interplay of the variables that were considered during the investigation. The first box contains the independent variable - the input of the study which is the division-initiated Learning Activity sheets (LAS) developed by the division Science writers during the series of workshops conducted by the division. While the second box contains the dependent variables of the study. Teachers and students perceptions on the scientific practices in the division-initiated Science LAS in terms of asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence, and obtaining, evaluating, and communicating information were compared and differentiated. Finally, the last box contains the study's final output on the improvement of scientific practices in the division-initiated Science LAS.

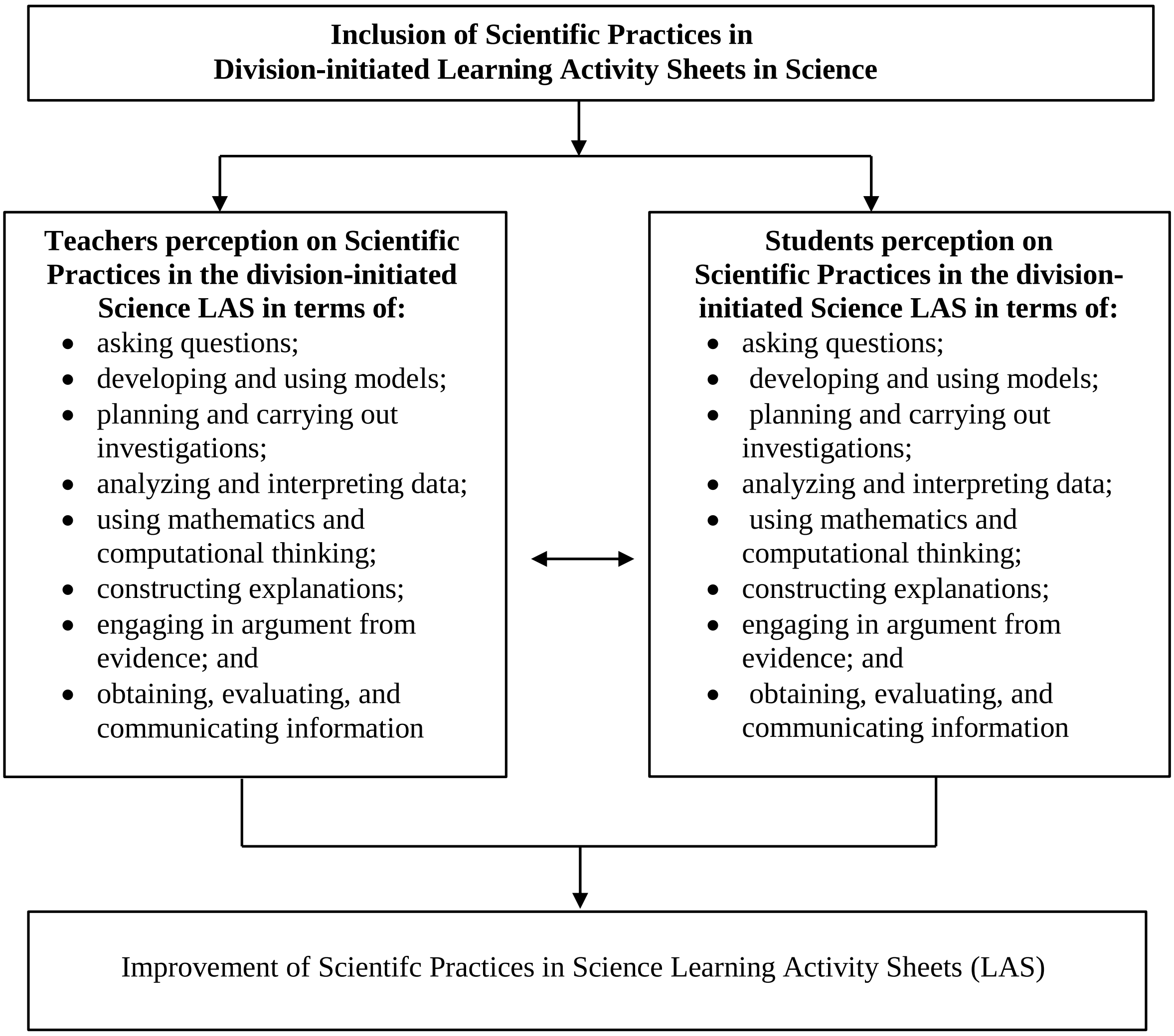

Figure 1. Paradigm of the Study Showing the Comparison on the Teacher and Student Perceptions on Scientific Practices in Science LAS used in the New Normal Education

Research Methods

Research Design

The study took a quantitative approach. *Quantitative research methods* emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through questionnaires and surveys, or by manipulating pre-existing statistical data using computational techniques. It focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon (Creswell, 2013). Moreover, this study employed non-experimental research to find out truths about a subject by describing the obtained data and determining their correlations. A descriptive-correlational research design was used for this study which investigates relationships between variables without the researcher controlling or manipulating any of them. A correlation reflects the strength and/or direction of the relationship between two (or more) variables. The direction of a correlation can be either positive or negative (Bhandari, 2021). This relation measured the degree of correlation between variables. It compared to their profile characteristics in this study.

A survey questionnaire was used as the primary data gathering instrument. Data collected were subjected to appropriate statistical analysis, and the findings were used as fundamental sources in discussing the answers to the specific problems of the study.

Locale and Time of the Study

This study was conducted in all secondary schools of Calbayog District composed of Calbayog 1, Calbayog 2, Calbayog 3, Calbayog 4, and Calbayog 5 and 6 districts of the Schools Division of Calbayog City, Philippines during the school year 2021-2022.

Participants of the Study

The study respondents were composed of fifty-six (56) secondary science teachers and three hundred sixty-seven (367) selected secondary students from Calbayog districts in the Schools Division of Calbayog City, Philippines.

Sampling Procedure

Complete enumeration sampling technique was employed to determine the teacher-respondents and simple random sampling technique was employed to determine the student-respondents. Further, Raosoft sample size calculator was used in calculating the sample size of the student-respondents using a 5% margin of error and 95% level of confidence. The identified secondary school teachers teaching science and students composed the actual respondents of the study. Therefore, this study made use of two sampling techniques.

Instrumentation

The instrument used in this study is an adapted instrument from the Science Instructional Practices Survey (SIPS): A New Tool for Identifying Progress in Teaching the NGSS by Hayes, K.N. Lee, C. S., DiStefano, R., O'Connor, D., & Seitz, J. (2016) and with some modified and enhanced statements patterned from the questionnaire of International Association for the Evaluation of Educational Achievement (1999) to suite the needed data on the scientific practices in Science LAS.

This study employed survey questionnaire as its primary data gathering tool. It assessed the teacher and student-respondents' perceptions on the scientific practices in Science LAS. The questionnaire is a Likert-type tool containing 71 items and composed of eight (8) sub variables in terms of (a) asking questions with ten (10) items; (b) developing and using models with nine (9) items; (c) planning and carrying out investigations with eight (8) items; (d) analyzing and interpreting data with eight (8) items; (e) using mathematics and computational thinking with eight (8) items; (f) constructing explanations with ten (10) items; (g) engaging in argument from evidence with ten (10) items; and (h) obtaining, evaluating, and communicating information with eight (8) items. The students responded according to a Likert-type scale of 1-5 (1 = Strongly Disagree, 2 = Disagree, 3 = Fairly Agree, 4 = Agree, 5 = Strongly Agree).

Data Gathering Procedure

The researchers first requested consent from the Superintendent of the Schools Division of Calbayog City to conduct the study in the schools of Calbayog district. Likewise, the researchers requested permission from the office of the Public Schools District Supervisors. Once approved, the researchers also came up with a letter addressed to the school heads informing the conduct of the study and their intention to gather information in their schools. Further, the researchers also wrote a letter to the respondents stating the purpose of the investigation, their participation, and the confidentiality of the information collected from them.

The target groups were informed with regard to the purpose of the research. The research instrument was explained through a cover letter attached to the questionnaire. Specifically, it outlines the purpose and importance of the survey and stated that the data will be reported only as an aggregate. Respondents were instructed not to place personal identifiers on the survey itself. Instructions on how to complete the survey were included at the top of the survey. Details of the individual responses were not used to identify individual responses. Also, the respondents were not in any danger of physical/psychological risk or physical discomfort. They had the opportunity to contact the researchers for further information related to the results of the research. The distribution and retrieval of the questionnaire was done thru face-to-face following the IATF protocol. The researchers with the help of statistician collected, totaled, evaluated, and tabulated the data using SPSS tools.

Results and Discussion

This section presents the mean and the standard deviation of the perceptions of the teachers and students on the inclusion of scientific practices in division-initiated Science LAS.

Table 1. Perceptions of the Teachers and Students on the Inclusion of Scientific Practices in Division-initiated Science LAS

Dimensions	Teachers				Students			
	N	**M**	**SD**	**Interpretation**	**N**	**M**	**SD**	**Interpretation**
A. Asking Question	56	4.23	.36	Agree	367	4.03	.33	Agree
B. Developing and Using Models	56	4.23	.45	Agree	367	4.14	.46	Agree
C. Planning and Carrying Out Investigations	56	4.09	.56	Agree	367	4.14	.50	Agree
D. Analyzing and Interpreting Data	56	4.22	.50	Agree	367	4.14	.51	Agree
E. Using Mathematics and Computational Thinking	56	4.21	.45	Agree	367	4.15	.51	Agree
F. Constructing Explanations	56	4.30	.40	Agree	367	4.23	.45	Agree
G. Engaging in Argument from Evidence	56	4.16	.41	Agree	367	4.20	.45	Agree
H. Obtaining, Evaluating, and Communicating Information	56	4.15	.50	Agree	367	4.14	.45	Agree
Overall Scientific Practices	**56**	**4.20**	**.30**	**Agree**	**367**	**4.15**	**.28**	**Agree**

Legend:

1.00-1.49 = Strongly Disagree (SDA)
1.50-2.49 = Disagree (DA)
2.50-3.49 = Fairly Agree (FA)
3.50-4.49 = Agree (A)
4.50-5.00 = Strongly Agree (SA)
M = mean, SD = standard deviation

Based on the table, the computed mean value of all variables of the scientific practices in the division-initiated Science LAS according to the perceptions of the two groups of respondents are between the value of 3.50-4.49 and interpreted as agree. The overall mean score of the two groups of respondents are 4.20 and 4.15 and interpreted as agree. This further indicates that both teacher and student-respondents agreed that these eight scientific practices namely; asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in arguments from evidence, and obtaining, evaluating, and communicating information are present in the division-initiated Science LAS. This implies that the division-initiated Science LAS of the Schools Division of Calbayog City followed the standards set by the K-12 Curriculum in teaching Science.

Table 2. Test of Difference Between the Perceptions on the Inclusion of Scientific Practices in the Division-initiated Science LAS of the Teachers and Students

Dimensions		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)
Asking Questions	Teacher	56	265.86	14888.00	7260.00	0.00
	Student	367	203.78	74788.00		
	Total	423				
Developing and Using Models	Teacher	56	239.92	13435.50	8712.50	0.07
	Student	367	207.74	76240.50		
	Total	423				
Planning and Carrying Out Investigations	Teacher	56	204.61	11458.00	9862.00	0.63
	Student	367	213.13	78218.00		
	Total	423				
Analyzing and Interpreting Data	Teacher	56	232.06	12995.50	9152.50	0.19
	Student	367	208.94	76680.50		
	Total	423				
Using Mathematics and Computational Thinking	Teacher	56	221.29	12392.50	9755.50	0.54
	Student	367	210.58	77283.50		
	Total	423				
Constructing Explanations	Teacher	56	225.28	12615.50	9532.50	0.38
	Student	367	209.97	77060.50		
	Total	423				
Engaging in Argument from Evidence	Teacher	56	194.98	10919.00	9323.00	0.26
	Student	367	214.60	78757.00		
	Total	423				
Obtaining, Evaluating, and Communicating Information	Teacher	56	213.58	11960.50	10187.50	0.92
	Student	367	211.76	77715.50		
	Total	423				
Overall Scientific Practices	**Teacher**	**56**	**232.98**	**13047.00**	**9101.00**	**0.17**
	Student	**367**	**208.80**	**76629.00**		
	Total	**423**				

*****Significant at the 0.05 level (2-tailed).

Using the Mann Whitney U test, the table above exhibits the difference of two groups of respondents' perceptions on the inclusion of the different scientific practices in the division-initiated Science LAS. The significant value of the two-groups of respondents in asking question is α = 0.00, and interpreted as significant, which means the perceptions of the two-groups of respondents in asking question have significant difference. However, the following significant values of the two-groups of respondents; developing and using models (α=0.07), planning and carrying out investigations (α=0.63), analyzing and interpreting data (α=0.19), using mathematics and computational thinking (α=0.54), constructing explanations (α=0.38), engaging in argument from evidence (α=0.26), and obtaining, evaluating, and communicating information (α=0.92) are all greater than 0.05 and interpreted as not significant, which means there is no significant difference on the perceptions of the two-groups of respondents in terms of developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence, and obtaining, evaluating, and communicating information

Therefore, the null hypothesis which states that there is no significant difference in the perceptions on scientific practices in the division-initiated Science LAS of the two-groups of respondents is accepted. There is insufficient evidence to conclude that there is significant difference between the perceptions of the two-groups of respondents on scientific practices in the division-initiated Science LAS because the correlation coefficient is not significantly different from zero.

Conclusion and Recommendations

Conclusions

In light of the findings of this study, the following conclusions were formulated:

1. Both the teachers and students- respondents perceived that scientific practices in terms of asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking , constructing explanations, engaging in argument from evidence, and obtaining, evaluating, and communicating information are present in the division-initiated Science LAS.

2. Although the two-groups of respondents have significant difference on their perceptions on the aspect of asking question, the rest of the aspects of scientific practices got the same perception from the two-groups of respondents. Considering the overall difference in their perceptions, both the teachers and students have the same perceptions (x=4.20, SD=0.30, and x=4.15, SD=0.28) on the inclusion of scientific practices in the division-initiated Science LAS. Therefore, the null hypothesis which states that there is no significant difference in the perceptions on scientific practices in the division-initiated Science LAS of the two-groups of respondents is accepted.

Recommendations

Based from the conclusions formulated, the following are recommended:

1. Science teachers should promote the importance of scientific practices in teaching Science in order to pique students' curiosity, capture their interest, and motivate their continued study. They should have stressed the importance of scientifically asking questions related to content and skills when developing activities and engaging scientific inquiry.

2. Students should immerse themselves in scientific practices in the areas of asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in arguments from evidence, and obtaining, evaluating, and communicating information. And explore why these are central to science and critical to appreciating the skills regardless of the learning modality being employed.

3. Sustain and consider the different scientific practices incorporated in the division-initiated Science Learning Activity Sheets (LAS) because acquiring skills in scientific practices supports a better understanding of how scientific knowledge is produced. Thus supporting students in becoming critical consumers of scientific information.

4. The division must offer trainings/seminars to the Science teachers, especially in the secondary level, relevant to their field of specialization to equip them in terms of the mastery of the subject matter or the content and in able them to think teaching strategies, techniques, and approaches in teaching science suited to their learners thereby avoiding the mistaken impression that there is one distinctive practice common to all Science.

5. For the future researchers, a challenge of conducting another study to compare the perceptions of teachers and students on the scientific practices on a wider scope.

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