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Determining the Intermediate Grade Pupils' Perceived Learning Difficulties in Science Class Experiences

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ABSTRACT

This study aimed to determine the pupils' perception of science classes in terms of five factors: learner-centered pedagogy, science inquiry activities, positive affect and attitudes, grades as feedback, and support for self-learning and effort, using an adopted and modified version of the Perception of Science Classes Survey. The researchers conducted a survey from Grades IV to VI with 186 pupils as participants. Among the five factors, learner-centered strategies got a very high level of perception followed by science-inquiry activities, grades as feedback, and positive affects and beliefs. Support for self-learning and effort got a moderate level of perception, the lowest level out of the five. Each factor was then compared across the grade levels, with grades as feedback the only one to have a significant difference that leads to the rejection of the null hypothesis which states that there is no significant difference in pupils' perception of science classes in relation to their different grade levels while the rest of the factors showed no significant difference. This study led to the development of 3 modules, one for each grade, to improve pupils' perception of factor 5.

INTRODUCTION

Science education is a foundational element in curricula worldwide, from basic to higher education, emphasizing the role of science and technology in daily life and the development of a scientifically literate society. It fosters essential 21st-century skills, such as adaptability and problem-solving (Kalogiannakis *et al.*, 2020). The use and integration of technology-equipment in science classroom instruction significantly impact students' performance relative to their National Achievement Test (NAT) result (Berame, 2023). However, numerous countries, including the Philippines, face substantial challenges in achieving science literacy. For instance, despite a slight improvement in the 2022 Programme for International Student Assessment (PISA) results, the Philippines remains in the bottom ranks, underscoring the ongoing struggle with science education quality and engagement (OECD, 2023).

Science learning, particularly in intermediate grades, often becomes a difficult and uninteresting subject for students, partly due to traditional teaching methods and a lack of effective engagement strategies (Ankucic, 2019). Students' attitudes toward science can be improved by a positive teaching style, which may also increase their cooperation, involvement, and performance. To address this, research highlights the need for science teachers to possess strong pedagogical skills to implement diverse and student-centered teaching methods (Saira *et al.*, 2021). This research investigates the challenges faced by Filipino intermediate-grade students in science classes, aiming to identify the specific obstacles they encounter and explore ways to improve science education quality in the Philippines. By addressing issues such as low comprehension, inadequate resources, and declining performance as seen in national assessments Behiga (2022), the study offers valuable insights for educators. This research seeks to measure and address the following problem on the pupils' perceived difficulties of learning experiences in science class grades IV to VI. in terms of learner - centered pedagogies, science - inquiry activities, positive affects and beliefs, grades as feedback, and support for self-learning and effort. The authors contribute to this field by analyzing students' perceived difficulties in science and providing recommendations to bridge gaps in current science education practices, ultimately supporting efforts to cultivate a more scientifically literate and engaged generation.

LITERATURE REVIEW

Science Learning Perceptions

Perception plays a crucial role in learning by enhancing memory and understanding, allowing students to process information more effectively. Research shows that positive perceptions of science increase when students engage in interactive and experimental methods rather than traditional lectures. Learning that incorporates teaching aids or hands-on tools also boosts students' motivation and interest in science (Kumar & Sampath, 2020). In contrast, negative perceptions of science often result from experiences with rigid, lecture-based teaching, which can decrease students' enthusiasm and motivation to learn (Ahmet Hakan Hançer & Ahmet Türker Tüzemen, 2008).

Several studies emphasize the need for more relevant, real-world connections in science education to engage students effectively. For example, students in England reported that classroom science felt disconnected from real-life issues and noted limited opportunities for hands-

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on activities (Bevins *et al*., 2011). These limitations reduce the curriculum's relevance, hindering students' ability to apply scientific concepts meaningfully. Moreover, students value teachers who bring expertise into the classroom and make science more engaging, which they believe would help bridge the gap between academic learning and practical application (Osborne & Collins, 2003).

Academic Impediments in Science Learning

The transition to post-pandemic education and the difficulties in teaching science thus, sufficient resources, creative teaching strategies, and continual teacher development are necessary for the provision of an interesting and successful science education (Nemalynne *et al*., 2023). Challenges in the Philippine education is rising, where students often perform below average in international assessments. The marginalization of science instruction, especially at the elementary level, affects students' understanding and interest in the subject. Many Filipino elementary students have limited science classes, with time constraints, teachers' low self-efficacy, and scarce professional development opportunities further hindering science education (Ambag, 2019). Despite some improvement in science scores, the National Achievement Test and PISA results underscore the need for targeted interventions by the Department of Education to strengthen science education quality (DepEd, 2017).

Students face multiple challenges in learning science, including difficulties in comprehending abstract scientific concepts due to traditional lecture-based teaching and limited hands-on learning. Studies indicate that students' motivation and interest greatly influence their learning pace and ability to grasp scientific knowledge (Kaptan & Timurlenk, 2012). In the absence of sufficient facilities and resources, educational institutions face challenges in delivering quality science education, which can considerably impede students' productivity and academic success. Moreover, the primary school science education curriculum frequently experiences modifications, which can lead to a lack of clarity in the scope and learning goals (Pariz Alparuq *et al*., 2024).

Perceived Learning Experiences in Science Class: Learner-Centered Pedagogies

A learner-centered approach is valued in higher education but underutilized in counselor education. This approach fosters a collaborative learning environment, encouraging students to actively engage with material and consider how it might apply to their future work. Science education, in particular, benefits from engaging content that connects to students' daily lives, fostering critical thinking and problem-solving skills crucial for academic and life success. Early exposure to stimulating science content can counter negative perceptions, sustaining students' interest in science over time (Edify, 2022).

In the Philippines, the K-12 curriculum shift highlighted a mismatch in in-service teachers' professional development, with fewer than 60% of elementary teachers having received recent science-related training (Calleja *et al*., 2023). Research underscores the importance of teachers' pedagogical content knowledge (PCK), linking it to improved student performance more significantly than content knowledge alone (Voss *et al*., 2011). Effective science teaching requires educators to simplify and communicate complex concepts, a skill at the heart of quality instruction. Strong PCK helps teachers meet standards like the Next Generation Science Standards, promoting a deeper understanding of scientific concepts among students (Hanuscin *et al*., 2019).

Science-Inquiry Activities

Inquiry is central to science education, as it engages students in active exploration, fostering deeper understanding of scientific concepts (National Research Center, 2011). Compared to traditional lectures, inquiry learning is used to teach a specific concept, fact or skill and leads the way to open inquiry where the student formulates his own problem to investigate. (Abdi, 2014). These exercises encourage students to think critically, evaluate information, and solve issues, which makes learning more engaging and significant (Bouwmeester *et al*., 2019).

While inquiry-based learning builds essential scientific skills such as observation, data collection, and communication, it can initially be challenging for students accustomed to passive, teacher-led instruction. With well-designed activities and appropriate teacher support, enhance students' communication, critical thinking, and problem-solving skills while also helping them understand scientific concepts (Kotsis, 2024).

Positive Affects and Beliefs

Well-designed science classes can positively impact students by deepening their understanding of scientific concepts and critical thinking skills (National Research Council, 2011). Interactions between teachers and students in public school settings, with the ultimate objective of improving learning outcomes for students (Bhattarai & Wagle, 2023). However, there are differences in how involved students are; some prefer practical exercises, while others find it difficult to remember complicated ideas, particularly while learning remotely (Best, 2019).

Learning is a social process where teachers facilitate knowledge-building, but students must actively engage and apply strategies for organizing and retaining information (Orlich, 2009). Academic performance often revolves around grades, which both reflect and influence ongoing achievement (Gray & Bunte, 2020). Poor grades can be disheartening, but identifying underlying issues can help students and parents develop strategies to improve, supporting long-term academic success (Enghofhi, 2023).

MATERIALS AND METHODS

This research employed a quantitative research design

as it obtained information to characterize the perceived difficulties of intermediate grade pupils. This paper examined pupils' perceived difficulties in learning experiences in science classes at Cogon Central Elementary School, Barangay 2, Buenavista, Agusan Del Norte. It deals with statistical measurement and numerical data gathering through a questionnaire.

Participants

The study involved 186 pupils who are from the Grade IV to VI levels, with 67 participants from Grade IV, 68 participants from Grade V, and 51 participants from Grade VI. A sample size of 186 was deemed sufficient to provide for the data collection.

Table 1: Distribution of the participants in the study

Grade Level	Population (N)	Sample Size (n)
Grade IV	81	67
Grade V	83	68
Grade VI	58	51
Total	222	186

This research used stratified random sampling, which means grouping a population based on their characteristics. The study also used Cochran's Formula (Cochran, 1977) for finite population.

$$n = \frac{n_0}{1+\frac{(n_0-1)}{N}}.$$

Using Cochran's Formula for each grade level, the researchers have determined that the sampling size of the study is n=186.

Instrument

This study used a survey questionnaire which was largely adapted from another research study by Bernardo, Allan & Limjap, Auxencia & Prudente, Maricar & Roleda, Lydia (2008), Kardash, and Wallace, (2001), and Sadera *et al* (2020). The tool has been validated by four experts and passed the reliability test before it was implemented. Specifically, the research instrument contains five (5) factors. Factor 1: Learner-Centered Pedagogy, Factor 2: Science Inquiry Activities, Factor 3: Positive Affect and Beliefs, Factor 4: Grades as Feedback, and Factor 5: Support for Self-Learning and Effort that will provide the answer to the statement of the problem. After

The pupils' answers on their perception of their science class when grouped according to their profile and factors was classified respectively using the 5-point Likert scale of statistical mean, range, value, and its descriptive equivalent.

Table 2: Evaluation Scale in Five-Point Range

Responses	Scale	Range	Interpretation
Strongly Agree	5	4.20 - 5.00	Very High Level of Perception
Agree	4	3.40 - 4.19	High Level of Perception
Not sure	3	2.60 - 3.39	Moderate Level of Perception
Disagree	2	1.80 - 2.59	Low Level of Perception
Strongly Disagree	1	1.00 - 1.79	Very Low Level of Perception

Procedure

The researchers conducted the survey during the last quarter of the school academic year to give the pupils more time to create their perceptions about their science class. It was also ensured that their answers will be kept confidential from anyone aside from the researchers. Lastly, the responses were checked and monitored to ensure that the chosen participants of each grade level have answered all the questions. The paper was then collected to be tallied, tabulated, processed, and submitted to the statistician for analysis and interpretation. In identifying whether there is a significant difference between pupils' perception of their science class, One-way Analysis of Variance (ANOVA).

RESULTS AND DISCUSSION

Problem 1. The inquiry activities, positive affects and beliefs, grades as feedback, and support for self-learning and effort.

Table 3 presents the data gathered from the survey questionnaire about pupils' perceived learning experiences in science class in terms of learner-centered - pedagogies. It shows the distribution of the first factor in terms of range means, and the verbal description obtained from the survey. It shows the discussions of the implications of the highest, lowest, and overall weighted mean respectively, supported by the related current studies.

Table 3: Mean distribution of the pupils' perceived difficulties of learning experiences in science class in terms of learner-centered pedagogies

Indicators	Level of Appreciation		Interpretation
	Mean	Description	
My teacher tries to find out if we understand our past lesson before teaching us a new lesson.	4.37	Strongly Agree	Very High level of perception
My teacher tells us what facts or concepts are important to learn.	4.39	Strongly Agree	Very High level of perception

My teacher tries very hard to connect new ideas to past lessons in science.	4.20	Strongly Agree	Very High level of perception
My teacher asks questions that help me understand my science lesson.	4.24	Strongly Agree	Very High level of perception
My teacher would try to do everything just to be sure that we understood the ideas taught in class.	4.34	Strongly Agree	Very High level of perception
My teacher tries hard to make sure students understand the lesson.	4.40	Strongly Agree	Very High level of perception
It is okay to ask my teacher for help if there are things I don't understand.	3.99	Agree	High level of perception
My teacher gives good examples and practical applications of science concepts.	4.18	Agree	High level of perception
My teacher encourages me to think and do the activity independently.	3.98	Agree	High level of perception
My teacher strongly encourages me to participate in classroom discussions.	4.13	Agree	High level of perception
Overall Weighted Mean	4.22	Strongly Agree	Very High level of perception
Range of Means: 1.00-1.49 Strongly Disagree; 1.50-2.49 Disagree; 2.50-3.49 Not Sure; 3.50-4.49 Agree; 4.50-5.00 Strongly Disagree			

As shown in Table 3, the statement "My teacher tries hard to make sure students understand the lesson" got the highest mean score of 4.40, which has a verbal description of strongly agree, and interpreted as very high level of perception. This means that the teacher puts in significant effort to explain concepts clearly and focus on pupils' comprehension. When a teacher is dedicated to helping students comprehend the material, students are likely to attain greater learning results. It is possible that educational strategies and objectives created to progress students' cognitive outcomes should focus on students' learning environment perceptions (Hafızoglu & Yerdelen, 2019) They do not just present information, they strive for understanding which highlights the importance of this type of teacher effort. The study found that teachers who use a variety of instructional methods and monitor student understanding throughout the lesson lead to better learning outcomes. Study emphasizes that teachers have a better chance of satisfying each student's unique learning demands if they have a deeper understanding of the differences (Felder & Brent, 2005).

Whereas the statement "My teacher encourages me to think and do the activity independently" got the lowest mean score of 3.98, which has a verbal description of agree, and interpreted as high level of perception. This means that the teacher is fostering pupils' ability to learn and solve problems on their own. Instead of simply providing answers, teacher ask questions that prompt pupils to analyse information, draw conclusions, and come up with their own solutions.

The overall weighted mean of the pupils' perceived difficulties of learning experiences in science class in terms of learner-centered pedagogies is 4.22, which has a verbal description of strongly agree. This implies that most of the pupils have a very high level of perception that learner-centered pedagogies' attempt to encourage comprehension and learning among the pupils. It aims to develop active engagement by involving pupils in discussions, projects, and problem-solving. Learner-centered pedagogy not only enhances comprehension through active retrieval practice but also fosters a growth mindset among students. Different learning styles are also taken into consideration by learner-centered teachers. They recognize that every student learns differently, and they try to provide opportunities for diverse learning styles, such as independent study, group discussions, hands-on learning, etc. (Sean McPheat, 2024).

Table 4 presents the data gathered from the survey questionnaire about pupils' perceived learning experiences in science class in terms of science-inquiry activities. It shows the discussions of the implications of the highest, lowest, and overall weighted mean respectively, supported by the related current studies. It primarily seeks to show the relevance of science-inquiry activities conducted by the teachers to the learning experiences of the pupils.

Table 4: Mean distribution of the pupils' perceived difficulties of learning experiences in science class in terms of science - inquiry activities

Indicators	**Level of Appreciation**		**Interpretation**
	Mean	**Description**	
My teacher connects new scientific activities to other science lessons.	4.21	Strongly Agree	Very High level of perception
I like the laboratory activities in my science class.	4.21	Strongly Agree	Very High level of perception

My science teacher likes us to make hypotheses and test our theories.	3.78	Agree	High level of perception
When I grow up, I will take a job that uses a lot of science.	3.96	Agree	High level of perception
The laboratory activities my teacher gives us are lively and fun.	4.14	Agree	High level of perception
My teacher lets us do scientific research projects.	4.15	Agree	High level of perception
My teacher promotes the idea that I am allowed to discover information together with my classmates.	4.15	Agree	High level of perception
My teacher relates the information that he/she teaches to the real world.	4.09	Agree	High level of perception
My teacher gives help when I don't know the activity.	4.19	Agree	High level of perception
The activities that my teacher gives are relevant to me.	3.93	Agree	High level of perception
Overall Weighted Mean	4.08	Agree	High level of perception
Range of Means: 1.00-1.49 Strongly Disagree; 1.50-2.49 Disagree; 2.50-3.49 Not Sure; 3.50-4.49 Agree; 4.50-5.00 Strongly Disagree			

As shown in Table 4, both statement "My teacher connects new scientific activities to other science lessons", and "I like the laboratory activities in my science class" got the highest mean score of 4.21, which has a verbal description of strongly agree, and interpreted as very high level of perception. This means that teacher connects new information to other lessons and past knowledge to strengthen existing understanding and creates a more cohesive picture of science. It follows that teachers should create a school setting that gives kids the impression that they have the same chances as their peers, that they can effectively connect with both teachers and friends (Hafizoglu & Yerdelen, 2019). Involving students in science inquiry activities is not just engaging, it's demonstrably effective. Research shows these activities enhance students' ability to think and act like scientists.

On the other hand, the statement "My science teacher likes us to make hypotheses and test our theories" got the lowest mean score of 3.78, which has a verbal description of agree, and interpreted as high level of perception. This means that teacher is encouraging pupils to actively engage in the scientific method, a process of discovery used to learn about the world around us. This aligns with the 21st century skills movement, which emphasizes the importance of critical thinking, collaboration, and problem-solving in a rapidly changing world (Partnership for 21st Century Learning, 2019).

The overall weighted mean of the pupils' perceived difficulties of learning experiences in science class in terms of science-inquiry activities is 4.08, which has a verbal description of agree. This implies that most of the pupils have a high level of perception that science-inquiry activities give emphasis on learning exercises that promote inquiry and scientific process-thinking abilities. Involving students in science inquiry activities is not just engaging, it's demonstrably effective. Research shows these activities enhance students' ability to think and act like scientists. By actively participating in investigations, students hone their observation, analysis, and problem-solving skills, transforming them from passive learners to critical thinkers who can analyze evidence and draw their own conclusions (National Research Council, 2019).

Table 5 presented the data gathered from the survey questionnaire about pupils' perceived learning experiences in science class in terms of positive affects and beliefs. It shows the distribution of the third factor in terms of range means, and the verbal description obtained from the survey. It shows the discussions of the implications of the highest, lowest, and overall weighted mean respectively, supported by the related current studies.

Table 5: Mean distribution of the pupils' perceived difficulties of learning experiences in science class in terms of positive affects and beliefs

Indicators	**Level of Appreciation**		**Interpretation**
	Mean	**Description**	
I understand the lessons my teacher teaches.	3.51	Agree	High level of perception
I am very good at science that is why I easily understand my science lessons.	3.32	Agree	High level of perception
The seat work and laboratory activities in this class are not boring.	3.69	Agree	High level of perception
My teacher is friendly.	3.70	Agree	High level of perception

Science has so much to do with my life.	3.73	Agree	High level of perception
My teacher has the motivation to teach well.	3.29	Agree	High level of perception
I am interested in studying science.	3.45	Agree	High level of perception
I find science class a difficult time	3.12	Not Sure	Moderate level of perception
I find science class a very interesting subject.	3.78	Agree	High level of perception
I feel comfortable in science class.	3.48	Agree	High level of perception
Overall Weighted Mean	3.51	Agree	High level of perception
Range of Means: 1.00-1.49 Strongly Disagree; 1.50-2.49 Disagree; 2.50-3.49 Not Sure; 3.50-4.49 Agree; 4.50-5.00 Strongly Disagree			

As shown in Table 5, the statement "I find science class a very interesting subject" got the highest mean score of 3.78, which has a verbal description of agree, and interpreted as high level of perception. This means that the pupils have strong enthusiasm for learning science in a classroom setting. It suggests that the pupils enjoy the subject matter and find the way it's taught engaging. This interest may lead to increased participation and enthusiasm in learning scientific concepts. It shows that science has the potential to inspire curiosity and a deeper understanding of the natural world among students.

Whereas the statement "I find science class a difficult time" got the lowest mean score of 3.12, which has a verbal description of not sure, and interpreted as moderate level of perception. This means that the pupils sometimes experience challenges or struggles when it comes to science class. This challenge might stem from several factors, including insufficient foundational skills in reading and mathematics, which can impede their performance in science classes that necessitate the application of these skills to scientific material. In essence, cultivating positive affects and beliefs is crucial for creating a thriving science classroom. Plan ahead for how the instructor will address different classroom management concerns and help students recognize the importance and relevance of science to enable them to cultivate a lifetime love of learning in this vital field (Jordan, 2021).

The overall weighted mean of the pupils' perceived difficulties of learning experiences in science class in terms of positive affects and beliefs is 3.51, which has a verbal description of agree. This implies that most of the pupils have a high level of perception that positive affects and beliefs express positive sentiments about the science teacher, learning activities, and the subject matter. Teachers' enthusiasm for science is contagious, and their creative lesson plans, like building model ecosystems or designing experiments, make learning interactive and fun. The teacher-student relationship includes a bond between a teacher and a pupil, fostering an environment that is rich in learning opportunities (Bhattarai & Wagle 2023). These engaging activities not only solidify understanding but also cultivate a sense of wonder and discovery in learners.

Table 6 presented the data gathered from the survey questionnaire about pupils' perceived learning experiences in science class in terms of grades as feedback. It shows the distribution of the range means, and the verbal description obtained from the survey.

Table 6: Mean distribution of the pupils' perceived difficulties of learning experiences in science class in terms of grades as feedback

Indicators	**Level of Appreciation**		**Interpretation**
	Mean	**Description**	
My grades in science are a good sign of how much I have learned.	4.13	Agree	High level of perception
My grades in this class are a good sign of how hard I studied in science.	4.08	Agree	High level of perception
My grades in science are a good indicator of how much effort I put into my science classes.	4.03	Agree	High level of perception
My grades in science are a good indicator of the quality of my work.	4.05	Agree	High level of perception
My grades are a good sign of my interest in class.	4.06	Agree	High level of perception
Overall Weighted Mean	4.07	Agree	High level of perception
Range of Means: 1.00-1.49 Strongly Disagree; 1.50-2.49 Disagree; 2.50-3.49 Not Sure; 3.50-4.49 Agree; 4.50-5.00 Strongly Disagree			

As shown in Table 6, both statement "My grades in science are a good sign of how much I have learned" got the highest mean score of 4.13, which has a verbal description of agree, and interpreted as high level of

perception. This implies a belief that academic grades are a reliable measure of learning and understanding in the subject of science. It suggests that higher grades correlate directly with a deeper or more comprehensive grasp of the material. This perspective assumes that the evaluation methods used in grading accurately reflect the student's knowledge and learning achievements (Hanuscin *et al.*, 2019).

On the other hand, the statement "My grades in science are a good indicator of how much effort I put into my science classes" got the lowest mean score of 4.03, which has a verbal description of agree, and interpreted as high level of perception. There is a clear relationship between a student's level of effort and the grades they obtain in scientific classes. Higher grades are an indication of more devotion and effort in learning the material. Deeper processing occurs when a learner is interested in and involved in their education.

The overall weighted mean of the pupils' perceived difficulties of learning experiences in science class in terms of grades as feedback is 4.07, which has a verbal description of agree. This implies that most of the pupils have a high level of perception that factor grade as feedback accurately reflects the pupils' levels of learning. The use of factor grades in science class feedback encourages students to adopt a growth mindset, viewing challenges as opportunities for learning and improvement rather than indicators of fixed ability. By receiving feedback that evaluates not only factual knowledge but also scientific inquiry skills and problem-solving abilities, students are prompted to approach learning as a dynamic process of exploration and discovery. This shift in perception aligns with contemporary educational theories emphasizing the development of meta-cognitive strategies and resilience in the face of academic challenges. Interest improves the quality of learning and fosters academic success by increasing attention and engagement. It is also positively related to a range of non-cognitive outcomes and even career choices (Steidtmann *et al.*, 2022).

Table 7 presented the data gathered from the survey questionnaire about pupils' perceived learning experiences in science class in terms of self-learning and effort. It shows the distribution of the fifth factor in terms of range means, and the verbal description obtained from the survey. It shows the discussions of the implications of the highest, lowest, and overall weighted mean respectively, supported by the related current studies.

Table 7: Mean distribution of the pupils' perceived difficulties of learning experiences in science class in terms of grades as feedback

Indicators	**Level of Appreciation**		**Interpretation**
	Mean	**Description**	
My teacher is more interested in finishing her lesson plan than helping us learn the lesson.	3.68	Agree	High level of perception
Getting high grades in this class depends more on being born intelligent than studying hard.	3.73	Agree	High level of perception
My teacher would provide us with support materials for self-learning.	3.05	Not Sure	Moderate level of perception
My teacher support me in self-studying if I do not understand a lesson.	3.21	Not Sure	Moderate level of perception
I do solve science problems at class because my teacher does guide us.	3.27	Not Sure	Moderate level of perception
Overall Weighted Mean	3.39	Not Sure	Moderate level of perception
Range of Means: 1.00-1.49 Strongly Disagree; 1.50-2.49 Disagree; 2.50-3.49 Not Sure; 3.50-4.49 Agree; 4.50-5.00 Strongly Disagree			

As shown in Table 7, the statement "Getting high grades in this class depends more on being born intelligent than studying hard" got the highest mean score of 3.73, which has a verbal description of agree, and interpreted as high level of perception. This means that natural intelligence is more important than effort when it comes to succeeding in science class. Intelligence is not fixed but can be developed through effort and learning. The educational policies of most governments indicate that including science and technology in the The educational pursuit of scientific literacy depends heavily on the school curriculum, and studies have shown that growth mindset treatments significantly raised students' grades in a variety of areas (Rennie *et al.*, 2018). This indicates that students often experience a sense of being overwhelmed by the vast material and the high expectations associated with scientific investigation, which results in challenges in maintaining motivation and dedicating the effort required to understand complex ideas.s

On the other hand, the statement "My teacher would provide us with support materials for self-learning" got the lowest mean score of 3.05, which has a verbal description of not sure, and interpreted as moderate level of perception. This means that pupils are uncertain about their teacher's offered resources that help pupils learn independently outside of class time. Teachers can provide "scaffolding" – temporary structures like resources or guidance – to help students develop their skills in

self-directed learning. In short, it is essential because scaffolding allows students to complete more difficult assignments than they could on their own, increasing the effectiveness and efficiency of their learning. (Gunstone, 2015). Deficiency in support mechanisms like books, brochures, or modules further underscores the challenges students face in developing effective self-regulation.

The overall weighted mean of the pupils' perceived difficulties of learning experiences in science class in terms of support for self-learning and effort is 3.39, which has a verbal description of not sure. This implies that many of the pupils have a moderate level of perception that support for self-learning and effort represents the perception that the teacher does not surely support individual pupils' attempts to learn in the science class. Pupils often encounter significant challenges in their science learning experiences, particularly concerning the level of support for self-learning and the effort required within the science classroom. It has shed light on the struggle many students face when transitioning from traditional teacher-centered instruction to more self-directed learning approaches (Hew *et al.*, 2016).

The perceived effort demanded in science classes can pose a formidable obstacle for learners. Findings showed that improving students' perceptions of science learning environments may enhance students' motivation, and thereby science achievement, thus students may feel disillusioned and disengaged from the learning process if they believe their efforts have gone unnoticed or unrewarded (Hafizoglu & Yerdelen, 2019). Furthermore, utilizing technological tools and adaptive learning platforms can enhance the personalization of the educational experience and offer students instant feedback, which caters to their specific learning requirements. By implementing such strategies and recognizing the diverse needs of learners, educators can better support pupils in overcoming the perceived difficulties associated with self-learning and effort in the science classroom.

Problem 2. Is there a significant difference in pupils' perception of science classes in relation to their different grade levels?

Table 8 presents the weighted mean and Analysis of Variance (ANOVA) which was conducted to determine if there is a significant difference in pupils' perception of science classes in relation to their different grade levels. There are five (5) dependent variables, and three (3) grouping variables in each dependent variable. ANOVA is used if it is statistically significant between the pupils' perceptions of science classes in terms of learner-centered pedagogies, science-inquiry activities, positive-affects and beliefs, grades as feedback, and support for self-learning and effort per grade level.

Table 8: One Way Analysis of Variance in pupils' perception of science classes in relation to their different grade levels

Dependent Variables	Grouping Variable	f-value	p-value	Remarks
learner - centered pedagogies	Grade 4	.097	.908	Not significant
	Grade 5			
	Grade 6			
science - inquiry activities	Grade 4	3.211	.056	Not significant
	Grade 5			
	Grade 6			
positive-affects and beliefs	Grade 4	.275	.762	Not significant
	Grade 5			
	Grade 6			
grades as feedback	Grade 4	12.879	.001	Significant
	Grade 5			
	Grade 6			
support for self-learning and effort	Grade 4	.609	.560	Not significant
	Grade 5			
	Grade 6			
Significant α 0.05 level				

It can be gleaned that on the grade level profile, only factor 4: grades as feedback indicates a significant difference by its significant value of .001 which is lesser than the α of 0.05 for statistical analysis. This leads to the rejection of the null hypothesis which states that "there is no significant difference in pupils' perception of science classes in relation to their different grade levels." This implies that grade level matters to the pupils' perception of science classes in terms of grades as feedback.

The use of different formulas for calculating grades around student performance, effort, and growth, a diverse number of tasks, and the incorporation of teacher judgment on individual students and strategies for the motivation of student effort differs from teacher

to teacher. In addition, according to numerous studies, variations on several teachers' grading criteria and judgement have been found even when they grade the same assignment (Allensworth, 2018).

Lastly, the findings of Guskey and Link (2018), states that the evidence teachers' use varies depending on the grade level of students. This means that a significant difference on factor 4: grades as feedback, is consistent with other studies.

Problem 3. Based on the findings, what Intervention material may be proposed?

Based on the results gathered and data analyzed, the researcher's study concluded that the pupils had a moderate level of perception of learning experiences in science class in terms of support for self-learning and effort compared to the other factors that had a high level or very high level of perception. In line with this, we propose a learning module as an intervention material that can be used by the teacher to improve the pupils' moderate level of perception on support for self-learning and effort. The teacher can give this to pupils who want to learn more or a pupil who has difficulty in understanding the topic. This proposed intervention material can be added to the instructional material repository of the classroom.

CONCLUSIONS

Based on the findings of the study, several conclusions can be drawn. The focus of the study is to determine the pupils' perceived difficulties in learning experiences in science classes at Cogon Central Elementary School. Pupils perceive learner-centered pedagogies as attempting to support students' comprehension and learning at a very high level. Pupils stressed that science-inquiry activities stress learning exercises foster inquiry and scientific process-thinking abilities. Positive affects and beliefs convey favorable sentiments from the learners about the science teacher, the learning activities, and the subject matter. In grades as feedback, most of the pupils have a high level of perception that factor grade as feedback accurately reflect the pupils' levels of learning. Nonetheless, support for self-learning and effort garnered the least perception among the learners, and so researchers proposed modules as an intervention material to improve and support the self-learning among the pupils. Meanwhile, significant differences in pupils' perception of science classes factor: 4 in relation to their different grade levels were observed. This leads to the rejection of the null hypothesis which states that there is no significant difference in pupils' perception of science classes in relation to their different grade levels. In light of the findings, the study proposes developing and implementing intervention material to enhance pupils' perception to science class. This interventional material offers more comprehensive information and is a tool for learners in mastering the lesson in science. While pupils appreciate engaging activities like learner-centered pedagogies and science-inquiry, the study identified a gap in support for self-directed learning.

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