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Competence of Pre-Service Science Teachers in Using English Language as Medium of Instruction

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ABSTRACT

Explore the crucial role that English plays as a teaching language in the discussion of science subjects, highlighting its importance on a global scale. Being the worldwide language of science, English plays a crucial role in promoting international cooperation, communication, and the sharing of scientific knowledge. The use of English as a medium of instruction allows for easy access to a vast library of textbooks, research papers, and instructional materials. It helps academics and science teachers interact with a multicultural community, take part in international conferences, and work together on cross-disciplinary initiatives. Being proficient in English guarantees admission to prestigious colleges and research centers that value English as the primary language of instruction, in addition to improving employment prospects in the global labor market. In addition, English also offers a consistent and standardized language for communicating difficult scientific ideas, which helps to promote understanding and prevent misconceptions. English serves as a common language for scientific terminology, which promotes professional understanding and strengthens the bonds within the international scientific community. This study emphasizes how important English is to the global advancement of scientific collaboration, communication, and knowledge exchange. Lastly, the use of English as a Medium of Instruction (EMI) when discussing science topics is significant for several reasons, as English is the standard language for scientific terms. This consistency guarantees that complicated scientific ideas are communicated with accuracy and clarity. Because it is a uniting language that facilitates global collaboration, access to scientific knowledge, and efficient communication among science teachers from diverse cultural and linguistic backgrounds, English is important as a medium of instruction when teaching science topics. It is a vital facilitator of advancement in the constantly changing realm of science.

Keywords: *Access to scientific knowledge, English as a Medium of Instruction (EMI), and international communication in science*

INTRODUCTION

According to Li (2018), the assessment of science teachers on the use of EMI is important to understand the impact of this approach on student learning outcomes and to identify effective strategies for implementing EMI in science classrooms. This assessment can provide valuable insights into the benefits and challenges of using EMI in science education, as well as identify areas where additional support and training may be needed for science teachers. Thus, this assessment will involve collecting data from science teachers on their use of EMI in the classroom, as well as analyzing student learning outcomes in science. The results of this assessment can provide recommendations for improving science education through the use of EMI, including strategies for effective implementation, ways to address the challenges of EMI, and suggestions for further research in this area.

The appropriate usage of language may be one of the factors needed to effortlessly understand in learning

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science. As to the Philippine setting, English is the mainly used language in teaching this field and this topic has been discussed to the Filipino students disregarding the fact that not all Filipinos can understand this language deeply because it is not their native language.

According to Hernandez (2015), "70 percent of the population is fluent in English, making the Philippines one of the largest English-speaking countries in the world". Despite that, it becomes a problem because of the position of English as a second language which is still a strange material for a learner, so, the mastery of its language still contains many hindrances Raja (2011).

As a second language, English is utilized in different fields here in the Philippines especially in education. Almost all the subjects offered in senior high school utilizes English as a medium of instruction, not excluding Science. According to (Ball, 2011; Benson, 2004; Pinnock, 2009a), it is still unknown if the teachers are having a hard time in class using English as a medium of instruction because of the differences between the language used as medium of instructions and their mother tongue. With the statement above, there's still a teachers speak and teach in a learners mother tongue during the discussion in a certain topic in science class that will lead for difficulty to find out if the teachers are having a difficulty in using EMI in a classroom set up.The researchers were inspired to conduct a study that given these gaps, the researchers aimed to conduct a study on the competence of pre-service teachers in using EMI in teaching. This study would qualitatively determine the proficiency of pre-service teachers in the use of English language particularly in classroom science teaching. The results of the study would add up to the existing literature regarding the affordances of English language in quality teaching and learning

In connection with, the researcher arrives that there will be two SDGs for this research. Thus, SDG #4 refers to "Quality Education," which is one of the 17 Sustainable Development Goals adopted by the United Nations in 2015. The goal aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Moreover, the SDG #4 targets include ensuring that all girls and boys have access to free, equitable, and quality primary and secondary education, promoting literacy and numeracy skills, improving access to affordable and quality technical, vocational and tertiary education, and increasing the number of qualified teachers. The goal also emphasizes the need to eliminate gender disparities and ensure equal access to education for vulnerable and marginalized groups, such as children with disabilities and those living in poverty.

Additionally, it highlights the importance of education for sustainable development and global citizenship, promoting values, and fostering social cohesion and peaceful societies. This is applicable in the research which is "Assessment on the Competence of BSED Science Teachers in Using Language as a medium of Instruction," is related to SDG #4. The use of language as a medium of instruction is critical to ensuring that students receive a quality education and can acquire the knowledge and skills they need to succeed in life. In order to achieve SDG #4, it is essential to assess the competence of teachers in using language as a medium of instruction. This assessment can help identify areas where teachers need support and training and can also help ensure that students receive a high-quality education that meets their needs.

Research Questions

The main purpose of this study was to determine the competence of pre-service teachers in using English language in teaching Science.

Specifically, this study seeks to answer the following questions:

1. What is the level of competence of the selected pre-service science teachers in the use of EMI in terms of:
   - 1.1 grammar;
   - 1.2 pronunciation;
   - 1.3 language of interaction; and
   - 1.4 language of instruction?
2. What were the opinions of Pre-service Science Teachers regarding the use of English language as a medium of instruction in teaching science topics?
3. What are the teaching strategies employed by the Pre-service Science Teachers in using EMI during the discussion?

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4. What are the difficulties or challenges of the pre-service science teacher that they experienced using EMI during the discussion?

5. Based on the findings, what intervention may be proposed to improve the Pre-service Science performance in teaching science with the use of EMI in the classroom?

Literature Review

English as a Medium of Instruction and Science Education

An innovative bilingual idea that has an impact on foreign language learning is, English as a Medium of Teaching. The EMI approach will gain greater traction in the future and help young people get ready for a globalized social and professional life. Although EMI is a relatively new teaching strategy, scientific research on teaching physics in English is just being started (Mathelitsch,2014). Correspondingly, language is a critical element in education. It is the medium on which the idea, concepts and techniques of the instructor is conveyed. Communication between the students and their instructors is one of the most crucial factors in building understanding and common ground in a classroom setting. However, researchers do not cease to critically consider the use of language in the classroom and how it deters or promotes students' learning and achievement. Undeniably, the language used as a medium of instruction is dependent on the subject to be taught. Universal subjects use English as their medium of instructions, given that Science is considered as a universal subject, it uses English as a medium of instruction; however, not all countries that teach Science applies English during discussion since it is evident that it is not their first language (Timms, 2019).

A new global order has been formed by globalization and advancing technology, and it necessitates a common communication channel (Marsh, 2006). English has become the dominant language today because it meets this need (Conrad & Mauranen, 2003). It is also the language of education, science, and technology, as well as many other spheres of human endeavor. As a result, English gradually became a required subject in many countries' curricula, from early childhood education to higher education (Marsh, 2006). It has evolved into a research language, a relevant knowledge transfer method, and a teaching tool in the field of education (Mahboob, 2014). English is a widely recognized example of a worldwide tongue. It is widely spoken everywhere. Many native speakers use it as their first language, while millions more use it as a second or foreign language. Many nations throughout the world also recognize it as an official language. For many people who speak languages other than English, it serves as a lingua franca and their primary form of communication. Moreover, the form of instruction is enabling giving students a tool that aids the understanding of topic knowledge a means of creating meanings for the environment (Kyeyune,2003).

As determined by EMI the practice of teaching academic courses in countries or where the majority of people do not speak English as their first language (L1) (Dearden, 2014). Many nations around the world that do not speak English have chosen English as a language of education. Some of them embraced it because of globalization, while others did it as a result of their colonial past (Kirkpatrick, 2011). As a case study, the expansion of English-medium classes in schools was also explored, along with the difficulties encountered in putting the policy on the medium of instruction into practice. The results showed that the strategy had been successful but that stronger classroom infrastructure with the newest technologies, good teacher preparation, and support from school administration were needed to create better results (Jayatunga, 2018).

In the discussion of language and education, language is usually defined as a set of symbols that is mainly used for communication (Robin, 2013). It can also be defined as a generic, communicative phenomenon and representation of one's culture. On the other hand, Noam Chomsky defined language as "a set of (finite or infinite) sentences, each finite in length and constructed out of a finite set of elements" (Natie, 2015). It is an aspect of human development of an individual in both cognitive and psychological perspectives. Likewise, according to McWhorter (2019), language refers to the grammar and other rules and norms that allow humans to make utterances that others can understand. It is used in reasoning out, expressing ideas, arguing a point, and providing instructions.

Even if communication is necessary, people around the globe speak in different language. In fact, there are countries that has more than 100 languages including the Philippines. The Philippines has 185 individual

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languages and one of the most widely spoken language, next to Filipino, is Cebuano-Visayan which is mainly used in Central Visayas and Mindanao (Eberhard, et al. 2019). Additionally, the first language in the Philippines is Filipino while English is studied in the country as second language or foreign language. However, in Central Visayas, specifically in Bohol, Filipino and English is considered as the second language and Cebuano-Visayan is considered as the first language.

Though all human beings acquire the language they first bump into, they can still learn many languages if they want to but it will be considered as their second language. According to the Basic Concept (2019), first language is the mother tongue of an individual that they acquired by being exposed to as a child while second language is the language an individual learned by gaining knowledge about the grammar, syntax, and other aspects of the language they aspired to learn. Language, in general, plays an important role in different aspects of life. It means to say that in the aspect of learning, the consideration of language as a primary tool in understanding and processing information is useful.

Correspondingly, language is a critical element in education. It is the medium on which the idea, concepts and techniques of the instructor is conveyed. Communication between the students and their instructors is one of the most crucial factors in building understanding and common ground in a classroom setting. However, researchers do not cease to critically consider the use of language in the classroom and how it deters or promotes students' learning and achievement.

As suggested by Halliday (2017), the relationship between language and education can be divided into three categories: (1) learning language (Children are learning both spoken and written language. They started to develop the use of complex grammatical structures and vocabularies. In addition, they have opportunities to learn how to express themselves through written language, but the complexity of language processes requires the children to be engaged in a whole language activity that distort language processes by getting rid of their complexity); (2) learning about language (The most known practice in a classroom for learning about language is through the study of grammar and spelling. The teaching and learning of grammar do not show the connection into the language they speak; hence, they are learning about a language different from the language they speak); and (3) learning through language (It gives light to the idea that learning in a classroom is accomplished through language specifically the scaffolding process in which teachers and students interact with each other by building their previous statements.)

Undeniably, the language used as a medium of instructions is dependent on the subject to be taught. Universal subjects use English as their medium of instructions. Given that science is considered as a universal subject, it uses English as a medium of instruction; however, not all countries that teach mathematics applies English during discussion since it is evident that it is not their first language (Timms and Pirls International Study Center, 2019). Children have trouble in understanding the lesson when English language is used but when it is taught in the dialect they usually use, they can understand it easily (Rowete,2015).

However, according to Sleeter (2012), instructors should understand that teaching mathematics in native dialect of students might be insufficient since there are mathematical terms that do not have direct translation to their native dialect. Similarly, science terminology as defined by the rigid observance of rules or conventions and choice of language, leads to building mathematical understanding from concepts to the application in real-life situations. Even though there are benefits with the use of second language, Barton et al. (2005) argues that students who are not fluent in the language of learning and teaching normally underachieve in science. Despite this case, the literature shows the importance of balancing the language of learning and teaching and local languages because focusing on one puts the students at a disadvantage. Moreover, a common observation among Filipino students who were taught in English is that they have difficulty in expressing the things that they have learned in English into their native language. One thing that Filipino teacher is find difficulty in expressing themselves in teaching science.

On the other side, Science instruction in the Philippines is conducted in the second-most popular language in the world after Mandarin is language used by Filipino students. A different respondent noted that the instructor frequently using English language in the classroom, leading to miscommunication, and not understanding the science courses. Hence, language has a significant impact on the improved comprehension of scientific principles (Kwok,2018). Thus, one unique aspect of the Philippine educational system, foreign languages are used as the

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instruction medium. There have been complaints that students may find it difficult to understand simple, pure English used as the instruction medium in their classes (Launio,2016). Despite the EMI policy being in place for an extended period, there is limited research, particularly in a qualitative Punjabi study, exploring teachers' perspectives on the abrupt adoption of English as the language of instruction (Bashir & Batool, 2017). Similarly, an examination of primary teachers' views on EMI revealed a generally supportive yet apprehensive stance. While they acknowledged the sensibility of the approach and its potential benefits for students, concerns were raised about the practical implementation of the policy and the readiness of teachers to meet the required standards (Channa, 2014). Communication is one of the core tenets around which education is built. As a result, only in the context of efficient communication can learning occur. The method of communication plays a crucial part in every step of the teaching and learning process. Many people find science concepts to be difficult, thus they need a way of understanding them in a way that is concise and simple lesson that the students can easily understand (David,2020). Moreover, EMI learning to teach science using English as the instructional language. Studies on important topics, like science education, are at the top of the agenda. But, since much of the world's information is written in English, teachers are being trained to instruct in these subjects in English (EMI).

This study utilized various legal bases. Pursuant to Rule II, Section 10.4 of the Republic Act No. 10533, entitled "Medium of Teaching and Learning", "basic education shall be delivered in languages understood by the learners as language plays a strategic role in the formative years of learners". Therefore, the teachers should use an appropriate language to be used during discussion to effectively facilitate the learning of the students. Experts have different views on what language is best used. Some would recommend the use of English and some the mother tongue of the students. However, English is still used as the medium of instruction in the country. This is supported by the Executive Order No. 210. It is stated that "English language shall be used as primary medium of instruction for English, Mathematics, Science and Health in all public and private schools. The percentage of time allotment for learning areas conducted in English should not be less than 70 percent of the total time allotment for all learning areas in all year levels." Instructors measure the learning of the students by assessing their academic performance. Academic performance is the measurement of the student's achievements across various subjects. Determining it is very important for both the instructors and the students. Seeing how a student performs at school will help him/her discover and improve himself/herself. Fortunately, there are a lot of ways to determine the academic performance of students, grades of them (which are most often a tallying or average of the students' "scores" during exams. If a student earns high grades, it determines that the student may also learn a lot while if a student earns low grades, it indicates lesser learning being one of them. (DepEd, 2019).

In the study conducted by Kola et al. (2013) entitled "Students' Proficiency in English Language Relationship with Academic Performance in Science and Technical Education" which sought to find out the relationship between proficiency in English language and academic performance among students of science and technical education, it was found out that proficiency in English language has a great impact to the students' academic performance in science and technical education. Likewise, according to the study by Hoffert (2009), students who have difficulty learning mathematics using the language they do not understand will affect their academic performance. Furthermore, there was a study conducted locally at Philippine Science High School in Northern Luzon (Ilocos Region Campus, Cordillera Autonomous Region and Cagayan Valley Campus) by Racca and Lasaten (2016) entitled, "English Language Proficiency and Academic Performance of the Philippine Science High Schools Students". They found out that there is a significant relationship that exists between the students' English proficiency and their academic performance in Science, Mathematics and English. Thus, the study concludes that students' English language proficiency could be a predictor in the students' academic performance.

Similarly, a study situated in Tanzania showed that, although teachers alternatingly switched between English and the home language, during the same conversation to empower learners to participate actively in the learning process, they also felt guilty about the same, suggesting that the use of learners' language in classrooms occurs to different degrees depending on teacher experiences (Mtana & O-saki,2017). The literature reviewed so far indicates that, irrespective of the mandates of education policy, it is teacher orientations that determine the classroom practices enacted by the teachers. There is a recurrent pattern of relationship between the role of language in broader society and its position in education (Mohanty,2008). In a few instances, where teachers have been subjected to training in bi-/multilingual education through in-service professional development programs,

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they complained about the uncritical, imitative deployment of practices from English-speaking nations, and were regretful of the fact that there had been no effort to evolve pedagogies sensitive to the local context. They argued that if multimodal ways of learning are legitimized in classrooms through policy directives, then the approach of learning only through English would no longer remain sacrosanct, and they would begin to see learner languages as resources (Chimirala 2017).

On the other side, English as the language of instruction in secondary schools is perceived as an obstacle to students' science learning because they are generally more fluent in their own native language than English (Juma, 2015). Many teachers struggle with switching from their own language as the medium of instruction in schools. However, this would pose problems because in the end students must answer examination questions in English. However, other country has a controversy surrounding the language of instruction in Tanzanian schools is ongoing and to date no sustainable solution from policy-practice has been found. Currently in Tanzania, parents, teachers, academics, policymakers, and students have different views about the language of instruction. Telli (2014) found that policymakers in Tanzania prefer English because it is an international language and argue that students need to become fluent in it through their schooling. Qorro (2006) argues that there are good reasons for "teaching English" but not "teaching in English" (p. 4), suggesting that students can become proficient speakers by learning English as a school subject.

Basically, Kiswahili needs to be the main language of instruction for all levels of education, arguing that it is widely used in trade, offices and throughout the country. While stakeholders continue debating of language of instruction issues in Tanzania, students are still facing challenges in learning for understanding science matters (Qorro,2006). Since most of the students had language limitations in English, their known language enabled them to learn science in a way that might not have been possible if the lessons had been conducted exclusively in English (Molander, & Wickman, 2017). In this kind of a situation, initiatives need to be done to improve students' learning for understanding scientific concepts. In contrary the study of Qorro, with regards the language of teaching, the new curriculum encourages the dominant use of the English Language as the medium of instruction at secondary school level. Many researchers and linguists have advocated against the teaching of science subjects in English (Nhongo, 2013). For example, Heugh (2005) reports that the use of English Language as medium of instruction contributes a great deal to the high failure and dropout rates. Basically, as long as Science learning is through the English medium of instruction, a few learners would access high quality education. The findings seem to be pointing to the fact that only those that are proficient in the English Language will ultimately pass the sciences, hence the reduced number of those that take it up to the Advanced Level.

In order to engage productively in science, students should understand how to participate in scientific debates, adopt a critical stance and to be willing to ask questions. They can only do so when they are proficient in the language that is used as a medium of instruction. Since English was introduced as a medium of instruction, teachers who used to teach science in their native language were compelled to teach science in English. However, no prior teaching was conducted for teachers to equip them with the skills required to teach science subjects in English. Given the lack of training among teachers and the poor performance of students on these tests, it is essential to study the perceptions of science teachers. The perceptions of content teachers hold great importance since they are key stakeholders in the implementation of English as a medium of instruction (henceforth EMI) policy. Without their capabilities, the policy goals could not be accomplished. Since the literature lacks the voice of secondary school science teachers on English as a medium of instruction, the present study aims to explore the perceptions of secondary school science teachers regarding EMI.

While the preparation for teaching primary science typically involves preservice teachers delving into and comprehending current theories that underpin a science curriculum, along with developing sufficient pedagogical and content knowledge (Fleer & Hardy, 2006). There is an additional challenge for teachers that they must learn to teach science in alignment with current education reform measures and navigate the intricacies of using English as the Medium of Instruction (EMI) (Hudson, 2008). Particularly in chemistry and physics classes, the level of difficulty is notably high, indicating a lack of conceptual understanding among students. This difficulty is evident as scientific students struggle to grasp the challenging material, adversely affecting their overall science learning experience. Furthermore, several respondents noted that the difficulty in comprehending science is compounded by the medium of instruction (Fleer, 2006). Since English is frequently used in class as a language of

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communication, students who are not native English speakers often have trouble understanding the courses.

As stated by the (National Center for Education Statistics, 2007), in today's 21st-century, students are facing multiple problems in the field of science education. Students had difficulties to understand the subject contents and express their opinions when teaching and learning are required to use English in the classroom (Manh, 2012: 265). When the students have low of English proficiency, it is difficult for the students to understand the materials that are explained by the teacher. This situation will make the teaching and learning process run ineffectively. There were several challenges interrelated to the lack of infrastructure and resources for teaching science. Challenges related to learners' background, the language of instruction, and lack of parental support are also present. Having these challenges, learning is negatively affected which should be immediately addressed.

On the other hand, Anudeepa's orientation towards language use in bilingual science classroom was similar to the teachers in study who considered learners' minority language as a barrier to science teaching–learning. To counteract these issues, she either showed in difference towards learners' minority, in this context, language or coaxed them to develop English-language repertoires for participation in the science classroom instruction. In this case, Anudeepa's orientation was similar to the "language as problem" orientation where teachers, ascribing to deficit thinking for minority language students' ability to think and learn, favor monolingual or all-English education programs. These education programs implicitly suggest to students speaking minority language that their language is of no value in social and educational growth. Hence, they should work towards abandoning their linguistic and cultural repertoires to assimilate in the popular culture of the English language (Lee,2009).

METHODS

Research Design

A qualitative research design is use in this study. It is used to gain understanding of underlying reasons, opinions and motivations. This kind of research also provides the insights into the problem or helps to develop ideas (De Franzo, 2011). The aim of Qualitative Research may vary with the disciplinary background, such as a psychologist seeking together an in depth understanding of human behavior and the reasons that govern such behavior (IJSRM,2017).

As such, the researchers use the Descriptive statistics to summarize and describe the classroom English proficiency of pre-service science teachers. Descriptive statistics help researchers to gain a better understanding of the basic characteristics of their data, providing a summary that facilitates interpretation and comparison. In data analysis, themes and categories were coded for each of the questions, and descriptive statistics were used to quantify the data where appropriate (see Hittleman & Simon,2006).

Respondent/Participants

The participants of the study were the Pre-Service Science Teachers of Cebu Technological University Main Campus for the school year 2023-2024 with a population of 45 pre-service teachers. In connection, pre-service science teachers were the respondents of the study to assess their competence in using English as a medium of instruction in teaching science. The purposive sampling method is a non-probability sampling where participants were chosen because they have the qualities needed for the study (Tango, 2007). Thus, this provides the best information to succeed in the study's objective.

Instruments of the Study

This study adopted the CLA (Classroom Language Assessment) from the study of (Education Bureau of Hong Kong, 2011, p. 80) examines four constructs: "grammatical and lexical accuracy and range; pronunciation, stress, and intonation; the language of interaction; and the language of instruction and to assess the proficiency of pre-service science teachers in the use of EMI in teaching science. In connection with the reliability of the CLA component at this time, confidential access to the statistics reports that the CLA has "high validity." (Coniam and Falvey, 2013, p. 152). The reliability and validity for the adopted scale were checked using the SPSS (IBM, 2015). The original application of this scale was through classroom observation. In this study, the scale was adopted into

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12 self-re-portable items, with a total of three statements per four components.

The four components are grammatical and lexical accuracy and range; pronunciation, stress, and intonation; the language of interaction; and the language of instruction (Education Bureau of Hong Kong, 2011). The language of interaction includes eliciting, responding and providing feedback; the language of instruction includes presenting, giving instructions and signalin; Grammar encompasses the rules of language and pronunciation is how words sound when spoken. (Education Bureau of Hong Kong 2011). The questions focused on their competence to teach English and the importance of teaching science using EMI; their preparation for using EMI in teaching science.

Procedure

The procedure is divided into the following phases:

Phase I. Asking Permission

A letter was sent to the Dean of College of Education, Dr. Reylan G. Capuno by the researchers as a means of asking permission for the conduct of the study.

Phase II. Preparation of Questionnaires

The adopted questionnaires for the participants were prepared by the researchers. Additionally, the researchers also prepared questionnaire in order to determine their opinions towards the use of English as a medium of instruction on their teaching.

Phase III. Preparation for the Implementation

Before the conduct of the study, the researchers approached Ms. Labiaga, the Research Adviser. The researchers also prepared the needed materials which is the use of google form.

Phase IV. Administration of Questionnaire

The researchers conduct a questionnaire on every section of 4th year BSED Science students to determine their perception of English as a medium of Instruction.

Phase V. Discussion of the Topic using English Language as the
Means of Instruction and Classroom Observation.

a. Discussion of the topic using English Language

The discussion of the topic is conduct with the use of English as a medium of instruction. The pre-service science teachers provide examples and activities to make sure that the students understand the topic.

Intervention

After the researchers gave the questionnaires to the participants, the researchers gathered all the answers in order to know the perceptions of pre-service science teacher of the use of English as a medium of instruction during the discussion. The study utilized online interviews to gather information from the participants. The information gathered was then transcribed and analyzed using thematic analysis and coding. After the analysis, recommendations were drawn.

Data Analysis

The researchers use the Descriptive statistics to summarize and describe the main features of a data set. These measures include central tendency measures like mean, median, and mode, as well as measures of variability such as standard deviation and range. Descriptive statistics help researchers to gain a better understanding of the basic characteristics of their data, providing a summary that facilitates interpretation and comparison. This study utilized thematic analysis and coding to examine the data collected from the interview. The researchers carefully examined the data to find recurring themes, topics, notions, and patterns of meaning that come up repeatedly. This method entails seven steps: transcribing, reading and familiarization, coding, searching for themes, examining themes, defining and labeling, and finalizing the analysis. Survey questionnaires, on the other hand, are structured instruments designed to collect data from individuals or groups. These questionnaires consist of a series of questions that respondents answer based on their perceptions, experiences, or opinions. The collected data can then be analyzed to identify patterns, trends, and relationships. (Braun & Clarke, 2006).

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Ethical Considerations

The University Research Ethics Office (UREO) and Cebu Technological University's Research and Development Office must both approve the survey before it can be carried out. The respondents were given an orientation to go over when they got the informed consent. The researchers treated all of the data that the respondents gave them in the strictest of confidence. Questions pertaining to the respondents' anonymity were strictly forbidden. When asked to participate in the study, the respondents have the option to decline. Any additional or follow-up inquiries from the respondents about the research project involving their participation that weren't covered in the informed consent were catered to and addressed. As a result, the study made sure to adhere to the moral principles of accountability, truth, and justice.

RESULTS AND DISCUSSION

Five themes emerged from the use of English as a medium of instruction in discussing science topics, including: (1) ensuring clearer delivery, (2) efficient and effective, (3) engaging and realistic, (4) easy and comfortable, and (5) language gap

Table 1. *Themes or Meaning Units, Key Concepts and Supporting Evidence*

Themes/Meaning Units	Key Concepts and Supporting Evidence
Ensuring clearer delivery	Key concepts The application of English as a medium of Instruction plays a vital role in learning science topics. With this being said, most of the participants, mentioned that with the help of English they can ensure that there's a clearer delivery especially in teaching science topics where they can't explain it through vernacular or native language. To ensure clearer delivery of the science topics in English, focus on concise explanations and use of simple words in the interaction to address the questions of the learners. Supporting evidence Common initiatives quoted from participants: "fostering a better understanding", "clearer delivery", "easier and accessible." "As a pre-service science teacher, incorporating EMI significantly facilitates well my communication, ensuring clearer delivery of my science topics." (P1) "Fostering a better understanding among my students in the classroom."(P1) "EMI makes it easier for me to explain science concepts, making lessons more accessible for pre-service teachers." (P4)
Efficient and Effective	Key concepts Ensuring effective and efficient aids for students when English is used as the medium of instruction for discussing science topics. In connection with this, educational institutions can create an environment that supports effective and efficient learning for students using English as a medium of instruction. This approach takes into account the diverse linguistic backgrounds of students and aims to provide a supportive and inclusive learning experience. The utilization of EMI aids students' science learning during classroom discussions by familiarizing them with scientific terminology in English. This exposure facilitates language acquisition and comprehension, helping students connect scientific concepts with English expressions. Supporting Evidence

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	Common initiatives noted from participants: “effective”, "efficient" and, "easy to understand" “To ensure comprehensive understanding in the classroom.”(P3) “Significantly, utilizing EMI aids my fellow pre-service teachers and me during science discussions in way of providing a language bridge which enhances our ability to articulate and comprehend complex scientific concepts more efficient and effective.” (P1) “Additionally, it also could possibly lead to potential misinterpretation of scientific terms, and the continuous need for language support to ensure.” (P3)
Engaging and Realistic	Key concepts Teaching strategies plays a vital role in delivering lessons With that, all of the participants mentioned that strategies composed of engaging and accessible activities are employed including interactive discussions, multimedia presentations, and hands on experiment. This way, student will not only improve their language skills but also deepen their knowledge of the certain subject. Supporting evidence Common initiative quoted from participants: “engaging” “better comprehension” “experience” “participation” “Incorporating multimedia resources and utilizing real life examples, and creating an engaging and comprehensive learning experience” – P32 “I employ real world examples when using EMI in teaching science, ensuring better comprehension among students- P4 “Hands on activities to enhance understanding, providing clear definitions of scientific terms and encouraging student participation through presentations”- P2
Easy and Comfortable	Key concepts Teaching science using English language helps student not just in understanding complicated topics but also in using the right scientific terms. EMI enables them to express and grasp difficult ideas easily. Moreover, using EMI enhance Students ability to articulate and comprehend. Supporting evidence Common initiative quoted from participants: “enhance learning experience “more comfortable” easily understand “enhance comprehension” “more effectively” “Utilizing EMI ensures that students grasp science topic more effectively during discussions” – P4 “Using EMI makes students more comfortable- they can ask questions, share ideas, and really engage with the material. It’s like creating a friendly space where science becomes more accessible and exciting for everyone involved” - P5

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Language Gap	Key concepts Teaching science using English language can be tough for teachers. There are challenges like not everyone understanding each other well, differences in language skills, and issues with cultural understanding. Some students may not be very good at English, making it hard for them to follow lessons. Teachers also need to adapt materials and tests to be fair for everyone. It takes extra effort to make sure everyone can learn well in an English-speaking class. Furthermore, most likely the reason why all participants mentioned language barriers as perceived difficulties in teaching using EMI. Supporting evidence Common initiative quoted from participants: "careful explanations" "potential misunderstandings" "understood technical words" "The main challenges in teaching science using English include language barriers for some students and the need for careful explanation to bridge potential understanding gaps"- P4 "Teaching science in English had some difficulties, like making sure students understood technical words and dealing with occasional language barriers"- P7 "Challenges may arise from differences in students' English proficiency, potential misunderstandings of scientific terms due to language barriers, and the need for extra support in addressing these language gaps" – P32

Ensuring clearer delivery

As a pre-service science teacher, ensuring a clearer delivery during the discussion of topics is essential for effective teaching and learning. It promotes comprehension, engagement, and positive learning experiences and prepares students for success in assessments and real-world applications of knowledge. Thus, clear communication reduces the likelihood of misinterpretation. Misunderstandings can lead to confusion, misinformation, and a lack of confidence among students.

"As a pre-service science teacher, incorporating EMI significantly facilitates well my communication, ensuring clearer delivery of my science topics and fostering a better understanding among my students in the classroom. I guess English as a medium of instruction adds greater help to improve students' level of understanding instead of normally using vernacular language since we all know English is our global language and with that fact, we are helping and fostering our future nation builders (students) to be as globally literate and globally competitive." P1

Also, clear delivery builds trust between the teacher and students. When students perceive the teacher as an effective communicator, it strengthens the overall teacher-student relationship.

"EMI makes it easier for me to explain science concepts, making lessons more accessible for pre-service teacher." P4

This entails that English has become an important international language globally and is often considered a key to opening the doors of success for many people on the global platform. Consequently, many non-English speaking countries have been implementing English as a medium of instruction (EMI) in academic institutions to ensure clearer delivery of the topics. Recently, educational institutions have been motivated to adopt EMI to achieve global recognition (Coleman, 2006). Furthermore, Coleman (2011) states that English plays a vital role in the learning of the students on the different topics. With this being said, the researchers can definitely say that

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the use of English as a medium of instruction in discussing science topics will ensure a clearer delivery of the topics.

Efficient and Effective

Educational institutions have the ability to create an atmosphere that facilitates effective learning for students with the help of EMI in discussing topics specifically for Science. Also, to improve the entire learning process, it combines a variety of educational strategies, technology aids, and continuing support systems.

"Significantly, utilizing EMI aids my fellow pre-service teachers and me during science discussions in way of providing a language bridge which enhances our ability to articulate and comprehend complex scientific concepts more efficient and effective." P1

"Also, as a teacher strategic planning is very crucial, aligning everything for effective and easy-going teaching-learning process." P3

According to Abuga (2019), there's an effective means of using English as a medium of instruction. In addition, Lakshya (2023) says that English-medium in schools allows the teachers and students to communicate more efficiently in learning. This also prepares students for future jobs where English will be the primary language of communication. Furthermore, teachers were motivated to use EMI in their classes. Also, the pre-service science teacher further stated that the students sometimes had difficulty comprehending science terms, and their exact translation was not possible in their mother tongues.

Engaging and Realistic

As teacher in training, we find it challenging to grab students' attention. It's tough to keep everyone interested due to different learning styles and attention spans. With that, using engaging and accessible activities when teaching in English to make learning fun and inclusive is essential. This helps students understand better, regardless of their abilities, and boosts language skills. It creates a lively classroom where everyone can actively participate, making the learning experience more effective and enjoyable for all.

"In my role as a pre-service teacher, I employed diverse teaching strategies which basically necessary for diverse students this includes interactive discussions, multimedia presentations, and hands-on experiments, all aimed at using English to make science content more engaging and accessible for students". – P1

With that, according to Ibrahim (2001: 128), as a medium, English is used to perform academic tasks involving various classroom- related communicative activities like gaining information and conveying information. It means that EMI is used in classroom activities such as listening, reading, speaking, and writing. He also said that the use of EMI in speaking can be forms of lectures, comments, discussions, presentations, interactions, tests and other activities. The use of English in teaching process can be presented through questioning, delivering the materials, language textbooks, and others.

Easy and Comfortable

English as medium of instruction helps students in learning science by giving them clear words to talk about complex things and making it easier and comfortable for them to understand. It helps students express their thoughts better and understand complicated scientific ideas. Learning in English also opens up a world of scientific books and materials, making knowledge broader. So, using English in science not only helps students in class but also prepares them to explore and enjoy science beyond the classroom.

"The utilization of EMI aids students' science learning during classroom discussions by familiarizing them with scientific terminology in English. This exposure facilitates language acquisition and comprehension, helping students connect scientific concepts with English expressions"- P32

As stated by Phyak's (2017), public schools started to implement EMI to help develop both their students' and teachers' English language proficiency. Thus, it was also mentioned that student perceptions often highlight of being comfortable and easy of the importance of clear communication in English. If a teacher uses EMI during the discussion, the students will perceive the instruction as clear and are more likely to engage in accurate and meaningful discussions.

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Language Gap

Language Gap pose difficulties because effective teaching requires clear communication. When we struggle with the language of instruction, it hampers our ability to explain complex science concepts in a way that students can easily understand. This impediment in communication can lead to misunderstandings, hinder student engagement, and limit the overall effectiveness of the teaching process.

"Perceived difficulties and challenges in teaching science topics using English as the language of instruction may include language barriers for students with limited English proficiency"- P2

Moreover, Linguistic challenges are those related to language issues confronted lecturers and students involved in EMI programs. These issues are encountered by non-native students as they struggle to understand the accented English of native lecturers (Ammon & McConnell, 2002) and they have difficulties to understand lecture content delivered in English in general (Hellekjær, 2010).

Note: Grammatical and lexical accuracy and range items are 1, 2, and 3; Pronunciation, stress, and intonation items are 4, 5, and 6; The language of interaction items are 7, 8, and 9; The language of instruction items are 10, 11, and 12. To get the data, the researchers use the formula in getting the mean and standard deviation where;

Mean = $(\Sigma x) / n$

Standard Deviation $(\sigma) = \sqrt{[(\Sigma(x - \mu)^2) / n]}$

Table 1. *Descriptive Statistics for English Proficiency*

Variance	Mean	Standard Deviation	Verbal Description
Grammar	3.627906977	3.202469977	Highly Competent
Pronunciation	3.674418605	3.263611924	Highly Competent
Language of Interaction	3.697674419	3.263611924	Highly Competent
Language of Instruction	3.790697674	3.348029618	Highly Competent

Legends:

	Categories	Verbal Description	
1	Strongly Disagree	Least Competent	1.00-1.79
2	Disagree	Less Competent	1.80-2.59
3	Neutral	Competent	2.60-3.39
4	Agree	Highly Competent	3.40-4.19
5	Strongly Agree	Very Highly Competent	4.20-5.00

Grammar and Lexical Range

With the data given, the researchers found out that most of the participants agreed that they can lecture with correct grammatical structures, a broad range of English vocabulary, and be able to use accurate words to express ideas with the use of English as a medium of instruction during discussion of the science topics and it ended with the verbal description of Highly Competent. Clearly, grammar may be taught in various ways, such as explicitly where it will be clearly stated by the teachers using the discussion and pointed out to the students. Thus, they have confidence that they can express their ideas accurately to the learners. (Hinkel & Fotos, 2002).

Pronunciation, Stress, and Intonation

In the given data above, it shows that stress and intonation are important elements of speaking that can greatly impact how a message is perceived by the listener. Schaetzel and Georgetown (2009) presented that there are a number of instructional strategies for teaching pronunciation that can help students meet their personal and professional needs. For example, teachers can cultivate positive attitudes toward accuracy, identify specific pronunciation features that pose problems for learners, and make learners aware of the prosodic features of language (stress, intonation, and rhythm). According to Kenworthy (1987) and Field (2005), the presentation of pronunciation rules for stress and teaching word stress are strategies that can improve students' pronunciation.

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Language Of Interaction

The language of interaction plays a prominent role in educational impact across the globe, yet many developing countries provide instruction in English International Encyclopedia of Education (Fourth Edition), 2023. In connection with this, the data above shows that improving EMI teachers' language of interaction may be a possible approach to enhancing their interaction competence (Llinares and Mendikoetxea, 2020). Arguably, how the EMI teacher perceives the importance of the language of instruction.

Language of Instruction

The results of this data show that language of instruction is a significant predictor that influences EMI teachers' teaching self-efficacy. To effectively increase EMI teachers' teaching self-efficacy, English language development could focus on teaching English, that is, the ability to implement effective classroom instruction. For example, the teacher might be taught how to use fixed sentence structures to explain concepts, terms, or lesson content and how to give clear instructions in English when conducting activities, giving homework, and managing the classroom. In addition, appropriate English signals to indicate stages of the lesson might also be strengthened through language training. The importance of language of instruction for quality and equitable education is recognized in the Sustainable Development Goals. (UIS, 2018).

CONCLUSION

Scientific terminology is commonly used in English. It guarantees that the Pre-service Science Teachers have a common understanding and offers a standardized means of expressing intricate scientific issues.

The Pre-service Science Teachers indicated in this study that using English as a medium of instruction appeared to be a successful way forward for a successful leaning happened to the students. These Pre-service Science Teachers claimed that in using English in delivering science topics allowed them to more effectively construct academic knowledge in the target students. In addition, these pre-service teachers needed to understand key scientific terms before a lecture commences, so there is greater familiarity when provided with new information around such terms.

Administration needs to listen to the pre-service teachers' testaments of success and incorporate or facilitate such practices in their coursework. Indeed, self-assessments may be used to measure the successful attainment of teaching science using EMI during the discussion. Investigating pre-service teacher development during this formative period can aid in refining programs to further enhance such development. The pre-service teachers in this study provided information about their preparation for teaching science using EMI that can guide educators' construction of coursework.

In summary, it is imperative that science discussions be conducted in English in order to promote global collaboration, provide access to worldwide resources, and educate students for successful careers in the scientific community. It encourages the use of a common language in scientific communication, allowing scholars and students to add to and profit from the world's scientific knowledge base.

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