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## Teaching Competence and Challenges Encountered in Secondary Science Instruction

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### ABSTRACT

The main purpose of this study was to assess the teaching competence of secondary science teacher instruction in terms of the teaching competence in educational qualification; eligibility; teaching experience; number of training attended; utilization of instructional support system such as laboratory apparatus, facilities and equipment; the teaching method employed and the relationship among these variables. The study was conducted in the big schools of the First Congressional District of Bohol. A total of 812 participants were identified comprising 72 secondary science teachers, 20 school principals and 720 students. The data were subjected to statistical treatment using the weighted mean to assess the teaching competence of science teachers as perceived by themselves, principals and students. The weighted mean was used to determine the educational qualification, performance rating, number of teaching experience, number of trainings attended, utilization of instructional support system such as laboratory apparatus, facilities and equipment and the teaching method employed by the science teacher. Analysis of Variance was used to determine the relationship of teaching competence between educational qualification, years of service, Bachelors and major Degree. Bonferonni and Holms Multiple Comparison test was used for years of service since ANOVA resulted to significantly different results. For the eligibility and performance rating, T-test for two independent means because they were only two (2) groups being compared. However, for the utilization of laboratory apparatus, facilities and other teaching resources and teaching methods employed, both use the correlation because the independent and dependent variables are continuous variables and that is, numerical scale was used. Findings showed that there is a significant relationship on teaching competence between number of teaching experience and teaching methods. This study found out that teaching methods and number of years in teaching affect the teaching competence. Hence, it is urged, that DepEd Personnel should utilize the result of this study and consider the proposed enhancement plan for the improvement of teaching competence in science instruction.

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### 1. Introduction

The goal of all instruction is to develop students' conceptual understanding. This can be achieved by means of planning instruction that will engage students beyond a superficial level, using a variety of representations and instructional strategies which make sense to the learner and take into account an individual learner's need (Professional Learning Board Online Continuing Education, 2017).

Research in Education has provided a deeper understanding of how students learn science and of the knowledge and skills required for academic achievement. The knowledge is important to teachers in guiding instructional decisions, and has implications for science education at all levels. An effective standard-based science curriculum is also necessary since it provides an excellent and equitable science education for all students and for a deep understanding of essential science concepts.

Quality classroom instruction depends on the competence of teachers. Teachers must be highly skilled, which means that they must possess technical and varied teaching skills. There must be a training and evaluation of teachers to enhance their competence, and this calls for specific targets with which to build the training. Many underlying factors were identified behind the low performance in science of Filipino students. These are: quality of science teachers, the teaching-learning process, the school curriculum, instructional materials, curriculum, administrative support, teacher training and funding (Science Education Institute, Department of Science and Technology, 2006).

Weakness in these areas manifest in the poor performance of the Philippine high school students in several standardized test, including the National Achievement Test (NAT). The Department of Education reports NAT mean percentage score (MPS) for high school in school year 2012-2013 was 51.41 percent or 23.59 percentage points away from the target. The MPS in science was 41.35 percent. Philippines participated in the assessment conducted by the Trends in International Mathematics and Science study in 2003, it revealed that Philippines scored 378 and ranked 34<sup>th</sup> out of 38 countries (HS II Math) and 43<sup>rd</sup> out of 46 (HS II Science). The quality of math and science education is somewhat better in higher education. The Philippines ranked 67<sup>th</sup> out of 140 countries in quality of math and science education in the 2015-2016, Global Competitiveness Report of the World Economic Forum for 2015-2016 and 79<sup>th</sup> out of 138 for 2016-2017.

In this scenario, the researcher believed it is important to assess the science instruction of the public secondary schools in the first district of Bohol. This research is conducted to identify certain weak areas in science instruction so that instructional improvement initiative can be directed where it is most needed. The areas needing improvement was construed as the contributory factor to the students' low performance in science. Moreover, the findings were to be the bases for the formulation of workable enrichment schemes such as training design, which will serve as the guide for the Division Supervisor and the In-Service Facilitator in science in their conduct of training programs for the science teachers.

## **2. Literature Background**

Science is for everyone. This principle recognizes the proactive relationship between science and society. This means putting science into the service of individuals and society. Science education should aim for scientific literacy that is operational in understanding oneself, common human welfare, social, and civic affairs. Science should permeate all levels of society. Whether or not students pursue a university education, they should leave school with a level of understanding and scientific literacy that will prepare them to be informed and participative citizens who are able to make judgments and decisions regarding science applications that will lead to develop socially, healthy, or environmental impacts (Brawner, 2011).

Active learning is a set of strategies that posits the responsibility for learning with the student. Different kinds of learning should be employed to students such as discovery learning, problem-based learning, experiential learning, and inquiry-based instruction are examples of active learning. Meanwhile discussion, debate, student questioning, think-pair-share, quick-writes, polling, role playing, cooperative learning, group projects, and student presentations are a few of the many activities that are learner driven. It should be noted, however, that even lecture can be an active learning event if students process and filter information as it is provided (Herr, 2007).

Dewey (1952) believed that children should allow to explore and discover things by themselves. In this case the teachers should not be in the classroom to act simply as instructors, but should adopt the role of facilitator, guide and develop the students as active and independent learners (Wheeler, 2014).

The six important skills that a learner should develop are from Bloom's taxonomy hierarchical skills which includes knowledge, comprehension and application as fundamental levels. While analysis, synthesis and evaluation as advanced levels or "higher level reasoning" (Herr, 2007).

Constructivism is a major learning theory, where it describes as a process in which students actively construct or build new ideas and concepts based upon prior knowledge and new information. This time the teacher is a facilitator who encourages students to discover principles and construct knowledge within a given framework or structure. Seymour Papert, a student of Piaget, asserted that learning occurs particularly well when people are engaged in constructing a product (Herr, 2007).

According to Socrates Programme, 2010, "Constructivist approach sees how teacher puts questions and encourages all students to express their opinion, stimulates the students to think independently and the number of instructions and direction are much less than in traditional classroom situation. Aside from that it offers different understanding for a learning environment."

Aside from the theories mentioned, this study is also grounded on some legal bases, As mandated in Section 10 of Article XIV of the 1987 Philippine Constitution, every Filipino citizen has the right to quality education. It provides that the state shall establish, maintain, and support a complete, adequate and integrated system of education relevant to the needs of the people and society. The Department of Education has taken steps to make education accessible to all.

The same section states that science and technology are essential for national development and progress. In line with this, the same section provides that the state shall give priority to research and development, invention, innovation and their utilization and to science and technology, training, and services (Official Gazette, 2015).

The constitution gives emphasis on how science and technology give positive impact to learners from which training for students and teachers are highly recommended to achieve this goal.

Moreover, the Department of Education particularly the Bureau of Secondary Education formulates and implements policies and programs of basic education, conducts studies and formulates curriculum designs and standards that will continually help upgrade the quality of secondary education. Secondary education programs cover Grades 7-12.

In fact, Article II of the Charter for Educators and the Educational Profession stipulated that the teachers and educators have the right to the facilities for further growth through democratic and constructive supervision and realistic programs of in-service education at the same time to take the duty to keep abreast with new developments in sciences and technology, and to use their newly acquired knowledge and skills to improve their professional competence (Official Gazette, 2015).

The aforementioned charter emphasized how teachers play a substantial role in developing scientific skills to the students by means of proper exposure of training and seminars of the teachers.

In addition, Division Order Number 35, s. 2016 - The Learning Action Cell as a K to 12 Basic Education Program School-Based Continuing Professional Development Strategy for the Improvement of Teaching and Learning gives emphasis on developing teacher's potentials.

In line with the aforementioned legal basis, it is hereby declared the policy of the State to promote the development of the country's science and technology manpower in line with economic development and to provide the capability required in the areas of research, development and innovation as well as their utilization. As such, it is important that the State provide for quality science and mathematics teachers in the secondary level, which would encourage more students to pursue careers in science and technology.

The implementation of Republic Act No. 7836, otherwise, known as the "Philippine Professionalization of Teachers Act of 1994" which was enacted on December 8, 1994, provides that no person shall practice or offer to practice the teaching profession in the Philippines without a valid certificate of registration and a valid professional license from the Professional Regulation Commission. This act raised teachers to a higher level in the social dimension of society. The professional license shall be renewed every other three years on the birth month of the professional teacher (Official Gazette, 2004).

To ensure that competent teachers are produced, the Professional Regulation Commission administers licensure examinations to education graduates and a screening committee in every school to rank the prospective teachers and they

will undergo oral and written examinations by the ranking committee before they will be given an appointment order to teach.

Standards of teaching, guidelines and performance indicators aim to assist teachers and supervisors to determine whether or not the expected competencies of effective teaching are met. All standards are essential in assessing the quality of work and serve as the foundation upon which teachers can continue to improve their repertoire of teaching. These performance standards contain indicators which present specific examples of the ways in which a standard can be reached.

Virginia Department of Education (2015) stated that the uniform performance standards for teachers are used to collect, gather and evaluate data in terms on teacher's performance. This can be done by monitoring, analyzing, and applying pertinent data compiled within a system of meaningful feedback to help support the continuous growth and development of each teacher.

Teacher evaluation tools are critical tools in identifying teacher effectiveness and student achievement. Many states and countries are implementing more rigorous evaluation tools to assure student growth and achievement. When school districts accept teacher involvement in the planning and designing of evaluation tools, the teachers tend to have a better attitude about evaluation processes. Teachers seem to want constructive feedback from evaluators to help guide them in becoming the best educators possible. Administrators must use the data and information obtained from evaluations to guide professional development that leads to a teacher's professional growth, otherwise, the purpose of the evaluation will not be met (Nelson, 2012).

It is encouraging to see school principals recognize that the intended outcomes of the expanded performance evaluation rating systems are to promote teacher growth, recognize excellence, and promote remediation. It is also encouraging to see that these same principals support the dismissal of those teachers who are ineffective and therefore potentially doing harm to our students. Although there are unintended impacts that may be interfering with growth and having an adverse effect on teachers, the study entitled *The Perceived Impact of Teacher Performance Ratings on the Teacher Evaluation* found out that instruction was positively impacted across all areas on teacher's growth. If the quality of our teachers is improving, that means the achievement of our students is also improving which is the ultimate goal of our profession (Bullis, 2014).

According to Springer (2014), teachers' ratings is consequential aspect that can affect perceptions of work. All else equal, teachers who receive higher ratings are more likely to indicate that they are satisfied in teaching. Thus, we show that differentiated teacher ratings can be used to disproportionately promote job satisfaction for more effective teachers. While it is intuitive that the result of receiving a higher rating on job satisfaction is positive, the evidence is present confirming the causal relationship that has meaningful policy implications, particularly in light of recent evidence that highly-effective educator is more likely than low performers to report being dissatisfied with some aspects of the profession (The New Teacher Project, 2012). Results also suggest an avenue by which new, more rigorous teacher evaluation systems may lead to improvements in workforce quality over time given the strong link between job satisfaction and turnover established in previous research.

Teacher experience and teacher educational attainment level have been viewed as two characteristics that are related to teacher quality. They may also be viewed as important criteria in selecting teachers, serving as proxy variables for skill level or expertise. Teacher educational attainment level refers to the highest educational degree obtained by a teacher (Greenberg et al., 2004) while teacher experience refers to the length of years a teacher has taught. Teacher experience is a topic of potential concern to policymakers as experienced teachers have more opportunities to teach higher level or advanced classes, and thus have higher achieving students in their classrooms. Thus, it is possible that students with poor performance have a double disadvantage because they are more likely to be taught by less experienced teachers (Greenberg et al.).

The study entitled *The Impact of Years of Teaching Experience on the Classroom Management Approaches of Elementary School Teachers* revealed that "years of experience" plays a significant role on teachers' beliefs on choosing their classroom management style. Experienced teachers choose to believe in maximum teacher responsibility; focus on more on the behaviour to quickly redirect it to positive, choosing traditional behaviour management (Unal Z, 2015).

In the study conducted by Bwendo (2015), entitled *The Effect of Educational Qualification on Job Performance: The Case of Social Security Commission in Namibia (SSC)*, it was confirmed that educational qualifications have a significant impact on job performance. The higher the education level, the more it affects the education and skill on job performance. Highly educated workers are more responsive at the work place working which leads to a more productive and meaningful performance.

The need for in-service training for teachers is a necessity in enhancing work performance and motivation of teachers in the field. This training allows include seminars, workshops, conferences, classes, exhibitions that are designed to develop and improve employees in an organization from the initial employment stage to retirement (Osamwonyi, 2016).

Ongoing professional development keeps teacher's up-to-date information, strategies and techniques on how children learn, emerging technology tools for the classroom, new curriculum resources, and more. The professional develop should wrap up the ongoing, experiential, collaborative, and connected to and derived from working with students and understanding their culture (Edutopia, 2008).

The instructional support system covers the curriculum, assessment, instructional practice tools, and student data for educators and administrators into one online system. It helps to improve student learning, facilitates research, and to increase student achievement. It is also intended to enhance the ability of educators to efficiently and accurately manage, analyze, and use education data, including individual student records (Wagner, 2017).

The above statement shows how instructional support system helps to work out the possibilities in improving a well-rounded instruction and keeping up breast on the educational data needed by the teachers.

Adeleye (2012) stated that the need for utilization of laboratory apparatus and equipment in the teaching of science curriculum allowed students to interact and understand science concept.

Ochiu and Ihejiamaizu (2016) also added that the utilization of laboratory equipment is directly linked to students' improved performance. When students are exposed to the use of these equipment, they tend to perform better than they would have done without these facilities.

Effectiveness of teaching depends upon the method that a teacher adopts. Group teaching does not happen overnight. For effective teaching, knowledge of different methods of teaching science is essential. The teacher, however, must be free to choose any method that he/she thinks is suited for the students. Students live in the real world and like to deal with concrete things. At the end, one can conclude that it is the teacher who should keep in mind which method is suitable to which type of students and under what circumstances. Every method has its merits and demerits. The choosing of methods depends upon your intelligence and resourcefulness (Pattnaik et al., 2014).

Instructional strategies are tools to be used in designing and implementing instruction in a way that supports and nurtures student learning. A teacher's task is to identify knowledge and skills the students bring to the classroom, what concepts and skills they need to improve, and what support structures need to be provided in order for them to meet the learning goals. It is the function of the teacher to judiciously select from a variety of strategies and techniques those which will most effectively enable learners to develop deep understandings of the topics and meet the intended learning targets (Schroeder, 2015).

Learning is a social and cultural process. The construction of deep scientific knowledge results from actively practicing science in structured learning environments. Learning environments should support students' active construction of knowledge. Thus, teachers should employ teaching strategies that help learners recognize conflicts and inconsistencies in their thinking, as these experiences catalyze the construction of new, more coherent knowledge (Staver, 2014).

Scientists use variety of methods for investigation in different circumstances. Explore, modelling, creative and discover are the important aspects that a teacher should deliver from his learner in order for the learners to develop their creativeness and to value how things work. As their abilities and understandings develop, students' progress along a continuum from 'school science' to 'working science' (New Zealand Ministry of Education).

According to Kaptan (2012) scientific knowledge is a big help to humankind. This knowledge will not be fully develop in the field of science education due to some reasons such as inadequate teacher compensation and professional development, insufficient number of science and technology teachers, lack of in-service training, and compartmentalized subjects taught in insufficient physical conditions of schools (less laboratory opportunities), intensive curriculum but insufficient time allocation and the instruction of lessons in an information level and students in passive position (only listening and writing), teachers in active position (writing on the board and teaching in a classical way).

According to Jalmasco (2014), the main factors that attributes for the low performance in science of the Filipino students are lack of support for a scientific culture, inadequate teaching learning process, insufficient instructional materials and lack of teacher training. Concrete sample situation are the lack of reference material and science equipment which hindered the opportunity to conduct scientific investigations and hands-on activities among Filipino pupils.

Teachers must keep up with an immense amount of paperwork. To do so, teachers must have superb organizational skills. Teachers must be organized in a way that they convey written material to students and parents as well, as advised by professional educator Angelica White, in her publication "Organizational Skills for Educators and Students Alike. As what Wile (2013) reveals, "Communications to students should clearly outline the expectations for assignments."

The teacher's role is not merely imparting knowledge but bringing real-time experience to the classroom for the students with result-oriented efforts. There are some skills that teachers themselves need to develop. One such skill is managerial skill as "management" is a practical skill and is very essential for effective functioning of an organization. There are two aspects of management, one is to learn management as a subject and the other is to become an effective manager. Its importance is never denied in any organizational setup but in the teaching scenario the role varies from that of a "pure management practices". Teacher's role today has become multi-dimensional. Aside from basic skills a teacher has, one should have a command over certain skills which are concerned to teaching-learning process, classroom management, handling pedagogical issues, and using technology for teaching. Therefore, it is a call for all teachers to understand these skills (Begum, 2012).

Teaching organizational skills plays an important role in a student's success. Many times intelligent students understand the material covered in class but missing or incomplete assignments hurt their averages. Showing students how one assignment changes a grade can make an impact on their outlook, but using and practicing daily organizational tools makes a difference in their future. Students with good organizational skills find it easier to study and complete assignments (Green,2017).

Brunette (2015) opined that how one manages the classroom is the primary determinant of how well the students learn. Students learn much as they engaged themselves to various activities but teacher need to guide them by giving some reminders on pros and cons as they engage themselves. The more students explore things thing by themselves the more they are active and appreciative on their day-to-day learning. One should remember that in the adult world the workplace needs interaction, asking questions, brainstorming, and seeking help (Brunette ,2015).

Teacher's load requires excellent time management skills. It needs balance on the expected task like making lesson plans, computing of grades, making exam and even also to communicate parents on student's progress. With effective time management skills, teachers can increase can be more productive and provide a better education for their students (Concordia Online Education Curriculum, 2013).

Nessipbayeva (2012) found out that effective classroom management, maximizing efficiency, maintaining discipline and morale, promoting teamwork, planning, communicating, focusing on results, evaluating progress, and making constant adjustments makes teacher be more effective. A range of strategies should be employed to promote positive relationships, cooperation, and purposeful learning. Organizing, assigning, and managing time, space and activities should ensure the active and equitable engagement of students in productive tasks.

Studies show that implementation of a good classroom management system has a positive effect not only on reducing disruptive behavior but also on improving academic scores (Oliver, Wehby, & Reschly, 2011; Wong & Wong, 2001) but creates a good impact on student engagement and success.

Assessment should be aligned with curricular goals, be consistent with pedagogy, be drawn from a variety of sources and be feasible. Students must be provided with multiple opportunities to demonstrate understanding, performance, or current thinking. It is also most powerful when students are involved in the process, not solely as responders or reactors. Any classroom activity will serve as an assessment; the data must be fed back into teaching and learning for the assessment to be more effective (National Academies Press (NAP), 2017).

Improving students' relationships with teachers has positive and long-lasting implications for both students' academic and social development. Students who have close, positive and supportive relationships with their teachers attain high levels of achievement and students, who feel a strong personal connection to their teacher receive more constructive guidance and praise. Aside from that, students who likely trust their teacher resulted in a positive impact on their learning process and foster their desire to learn (assuming that the content material of the class is engaging, age-appropriate and well matched to the student's skills (Kaufman and Sandilos, 2017).

Positive and healthy relationships between teachers and students create a healthy environment. This healthy atmosphere can be achieved through proper communication, demonstrating caring among themselves, and developing classroom pride. As positive student-teacher relationships continue to develop, the long-lasting effects benefit not only students and teachers but parents and administrators as well (Gleaton, 2012).

Teachers should be open-minded and need to understand that in schools, students differ in terms of attitudes, learning style, skills and potentials. Thus, teachers must establish a positive relationship with their students in order to provide the learning opportunity as well as the motivation they need to be successful in both academic and curricular activities. Exposure and awareness are a key for the learners to prepare themselves before they go out into the real world. Researchers revealed that better contact and more closeness between teachers and students results in higher student motivation (Yunus, 2014).

In the study conducted by Stanovich (2010) entitled *Using Research and Reason in Education: How Teachers Can Use Scientifically Based Research to Make Curricular & Instructional Decisions*, it says that demonstrating student learning may seem like an easy task, but reflection reveals that it is a complex challenge requiring educators to use specific knowledge and skills. On the onset of curriculum in science, it must contain the most significant knowledge, skills and attributes that schools want their students to learn because learning outcomes will be a point of reference on the assessment of learning. Therefore, appropriate instructional methods should be considered for the designed curriculum. Applying effective instructional strategies and methods leads to student achievement.

The science of teaching science encourages K-12 teachers to explore ways to improve their teaching practice. It takes an in-depth look at the real classroom so that teachers can focus on the issues involved in teaching science. Modeling of other teachers is a good avenue to encourage new teachers to be motivated in their task and veteran teachers will be given an opportunity to try new approaches to teaching (Annenberg Foundation, 2017).

From the National Academies Press (NAP) published reports on their study *Science Teachers' Learning: Enhancing Opportunities, Creating Supportive Contexts*, it was revealed that schools need to be structured to encourage support on the ongoing learning for science teachers especially to the neophyte teachers as they enter the profession of science teachers. They need to be exposed as they shape their preparation, the grades and content areas they teach and the contexts in which they work. Merging the gap between the new way of teaching science and current instruction requires individual teachers to answer their learning needs, as well as to provide a larger system of practices and policies (such as allocation of resources, use of time, and provision of opportunities for collaboration) that shape how science is taught.

Another study of Okoye et al (2013), *Teachers' Quality, Instructional Strategies and Students Performance in Secondary School*, it shows that quality instructional strategies greatly influence students' performance. This means that teachers should prepare different strategies to produce desired output from students' learning.

Barberos (2017) revealed in his study *The Effect Of Teachers' Teaching Style On Students' Motivation* showed that student motivation – participation and homework and grades had a positive impact towards students' learning in science. It was also the same on the use of varied teaching style which covers the teacher's relationship with students, using instructional materials that were easy to understand, and presenting the lessons in many ways and students were able to understand how the science teachers deliver the lesson.

Jalbani (2014) cited his findings on his study *The Impact of Effective Teaching Strategies on the Students' Academic Performance and Learning Outcome in Science* that great emphasis has been laid on the teachers to use effective teaching strategies and method for improved learning by many researchers and educationists on teaching science but on the other hand, one must also understand that the amount of students' learning in a class also depends on their native ability of cognition as well as their prior preparation. Teachers should prepare mental set through rapport with students before they start teaching.

Zuelke's (2010) study on the *Relationship Among Science Teacher Qualification, Instructional Practices, and Student Science Achievement* showed that there was a significant difference at the low socio economic status (SES) level in the eighth grade student mean for science Florida Comprehensive Assessment Test (FCAT) scores among teachers with professional certification compared to teachers with temporary certification. There was no significant effect between professionally certified teachers and temporary certified teachers at the high SES level. No significant difference in eighth grade student mean Science FCAT scores among teachers with different years of teaching experience. The findings suggest that teachers without professional certification do not assist low SES students in realizing achievement in science.

Another study of Wang (2012) entitled "*A New Era of Science Education: Science Teachers' Perceptions and Classroom Practices of Science, Technology, Engineering, and Mathematics (STEM) Integration*" suggested that the secondary science teachers might misuse some science concepts, such as inquiry, because they did not distinguish science and engineering in their STEM integration lessons. In addition, the teachers' STEM integration focused on certain qualities such as problem solving, application, and engineering design. However, when teachers focus on problem solving, application, and engineering design in their STEM integration lessons, the lessons actually become more engineering focused rather than including a strong science focus.

Goh's study (2012) *Investigating Science Teachers' Understanding and Teaching of Complex Systems* The findings revealed that while science teachers might appreciate the complex nature of systems, their understanding was not comprehensive. This means that teachers can explain well in the field of Biology but for Physics, Chemistry were not explicitly taught.

Lastly, the study conducted by Kirkpatrick (2012) entitled *Teacher Perceptions of Their Science Teaching and Student Learning for Diverse Learners* asserts the following: first, assertion is that there are different ways of conceiving and organizing teacher preparation, reflecting perception of teaching and learning to teach and different orientations to the preparation of teachers for diverse learners. Second, there are tensions in science education regarding scientific epistemological views, reflecting key differences in core values and worldviews, and essential components for guiding instructional practices for diverse learners. The third assertion is that there are disconnections between theory and practice of approaches to prepare teachers for work in urban contexts and to comply the needs of diverse learners. The fourth assertion is that there are gaps organizationally and conceptually between science education and culturally responsive pedagogy.

Hence, the theories and the aforementioned findings of previous studies prompted the researcher to assess the science instruction in the secondary schools of Bohol.

### **3. Methodology**

This study was descriptive in nature, which made use of the normative survey. This approach was employed to investigate the profile and the instructional support system used by the secondary school science teachers and their teaching competence. The data was analyzed with the hope of proposing enrichment schemes which would be beneficial to the Tagbilaran City and the Division of Bohol.

### **3. Results and Discussion**

The main thrust of this study was to assess the science instruction in the secondary schools of Bohol during the school year 2017-2018.

Specifically, the study purported to answer the following questions: The profile of the secondary school science teachers in terms of eligibility, performance rating, educational qualification, teaching experience in science and the number of attendance to training relevant to Science teaching; The extent of the utilization on the instructional support system in terms



of: facilities, equipment, and other resources in teaching science; the methods employed by the science teachers in teaching science; The science teachers' competence as perceived by teachers themselves , principal and students in terms of organizational skills, management skills, assessment skills and student-teaching relationship skills?;Is there a significant difference between the science teachers the school heads and students perception on the teachers teaching competence?;Based on the results of the study, what enrichment schemes may be proposed.

The study was administered in identified secondary schools in the First District in Bohol. The respondents were the secondary science teachers, principal and students of the selected secondary schools in Tagbilaran and the Division of Bohol for S.Y. 2017-2018. There were a total of 20 principal-respondents, 72 secondary science teacher-respondents and 720 students-respondents. Thus, a total of 812 research participants were the data sources in the study.

The data were subjected to statistical treatment using the weighted mean to assess the perception of the principal, science teachers and students, the teaching competence of the science teacher in terms of instructional, management, assessment and student-teacher relationship.

Analysis of variance (ANOVA) was utilized to determine the relationship of teaching competence between educational qualification, years of service, bachelors and major degree. Bonferonni and Holms Mutiple Comparison test was used for years of service since ANOVA results to significantly different results. For the eligibility and performance rating, t-test for two independent means because they were only 2 groups to be compared. However, for utilization of laboratory apparatus, facilities and other teaching resources and teaching methods employed both use the Pearson r correlation because the independent and dependent variables are continuous variables.

#### **4. Findings**

The study revealed the following findings:

##### **4. 1. Profile of the Secondary School Science Teachers**

###### **4. 1.1 Performance Rating**

It showed that 97.2% of the science teachers had a performance rating of 97.2% under Very Satisfactory rating and 2.8% of the teachers were on the Satisfactory rating in terms of their performance.

###### **4. 1.2 Educational Qualification**

It revealed that out of 72 respondents, 18(29,2%) were bachelor's degree holders , 41 (58.33%) earned units in master's degree, 5 (6.9%) obtained complete academic required, 5 (6.9%)were full-fledged MS/MA Graduate. Data further showed that three (4.2%) respondents earned doctor's degree units and nobody have graduated in a Doctor's degree program.

###### **4.1.3 Teaching Experience in Science**

Out of seventy-two respondents, 18(25.096%) had 1-7years of Science teaching experience. A number of 26(36.10%) had Science teaching experience for 8-14 years , 17(23.61%) for 15-21 years, 4 (5.60 %) for 22-28 years and 7 (9.72) for 29-35 years, respectively.

###### **4.1.4 Number of Trainings Attended Relevant to Science teaching**

Data revealed that most of the teachers had attended division level in terms of in-service training for Science teaching at 39 (87.5%). Significantly, 13 (18.06%) for the regional level and 6 (8.33%) had attended the national level in Science teaching-related trainings .

##### **4. 2 Extent of the Utilization of the Instructional Support System**

###### **4. 2.1 Laboratory Apparatus**

On the utilization of laboratory apparatus in the field of Earth Environment, Biology, Chemistry and Physics, it was rated as 1 or "Least Utilized".

###### **4.2.2 Facilities**

The weighted mean in terms of the utilization of facilities, was 0.17 or "Least Utilized".

#### **4. 2.3 Other Resources in Teaching Science**

The weighted mean in terms of the utilization of other resources in teaching science, was 1.36 or “Least Utilized”.

#### **4. 3. Teaching methods Employed by the Science Teacher**

Results of the study showed that “Discussion method” had the highest rank with the weighted mean of 3.25 as “Very Great Extent”. Meanwhile, “Research method” had the lowest rank with the weighted mean of 3.04 or Little Extent.

#### **4.4. Teaching Competence as Perceived by the Science Teachers, students and principal**

##### **4.4.1 Instructional Skills**

Science teacher, students and principal rated all the items as “Excellent”. The item “make lesson objectives aligned to the curriculum standard and learning competencies” had the highest rank with the overall weighted mean of 3.70 or “Excellent”. On the other hand, “utilize technology resources in planning, designing and delivery of the lesson had the lowest rank with the overall weighted mean of 3.33 or Excellent.

##### **4.4.2 Management Skills**

Data showed that in terms of management skills, teachers, school heads and students rated all items as “Excellent”. The item “consistently establish and maintain standards of learners’ behavior” had the highest rank with the overall weighted mean of 3.61 or “excellent” while “budget time appropriately according to the different stages of learning” had the lowest ranks with the overall weighted mean of 3.31 or “Excellent”.

##### **4.4.3 Assessment Skills**

In terms of the assessment skill, data have shown that the overall descriptions of the 10 items were 3.49 described as “Excellent” with the overall weighted mean of

##### **4.4.4 Student-teacher Relationship Skill**

Results indicated that teachers, school heads and students were very good in their relationship since all the items were rated “Excellent” with the overall weighted mean of 3.37 or Excellent.

#### **4. 5 Difference of the Teaching Competence as Perceived by the science teacher, students and principal**

There is a relationship between the teaching competence as perceived by the science teachers. principals, and students. Therefore, the null hypothesis is rejected.

#### **4. 6. Relationship of teaching competence on**

##### **4. 6.1 Educational Qualification**

There is no significant relationship on the teaching competence and educational qualification.

##### **4. 6.2 Performance Rating**

There is no significant relationship between the teaching competence and teacher’s performance rating.

##### **4. 6.3 Years in Teaching**

There is a significant relationship between number of years (15-21 years) in teaching and teaching competence.

##### **4. 6.4 Number of Trainings Attended**

Data portrayed that there is no significant relationship on the number of trainings attended and teaching competence.

##### **4. 6.5 Teaching method**

It showed that the methods that had a significant relationship to teaching competence are generic competency, inquiry, eclectic, content, reading and process.

#### **5. Conclusions**

The primary purpose of the study was to assess the science instruction in the secondary schools of Bohol during the school year 2017-2018.

Specifically, the study sought to answer the following questions:

1. What is the profile of the secondary school science teachers in terms of:
  - 1.1 performance rating;
  - 1.2 educational qualification;
  - 1.3 teaching experience in science; and
  - 1.4 number of attendance to training and seminar relevant to Science teaching?
2. What is the extent of the utilization of the instructional support system in terms of:
  - 2.1 facilities;
  - 2.2 equipment; and
  - 2.3 other resources in teaching science?
3. What methods are employed by the science teachers in teaching science?
4. What is the science teachers' competence as perceived by teachers themselves, principal and students in terms of
  - 4.1 instructional skills;
  - 4.2 management skills;
  - 4.3 assessment skills; and
  - 4.4 student-teaching relationship skills?
5. Is there a difference on the teaching competence as perceived by teacher themselves, principal and student?
6. Is there a relationship between teaching competence and the following:
  - 6.1 performance rating;
  - 6.2 educational qualification;
  - 6.3 teaching experience;
  - 6.4 number of in-service training;
  - 6.5 instructional support system; and
  - 6.6 teaching method?
7. Based on the results of the study, what enrichment schemes may be proposed?

Based on the findings, the following conclusions drawn:

There is a significant difference on the teaching competence as perceived by the teachers, principals and teachers.

Teaching method employed by the science teacher and years in teaching are determinants in the teaching competence in teaching science. Thus, science teachers should be creative in his/her teaching methods in teaching science. Students should develop standard scientific skills and concepts.

This study served as a great contribution to the following:

**School Administrators.** The findings may provide vital information on the priority developmental needs of the teacher towards the improvement of science instruction, not just in Science but across subject areas making them better supervisors and colleagues for teachers.

**Science Teachers.** This study will serve as a guide for a more effective secondary teaching of Science. Likewise, it will provide insights as to their strengths and weaknesses as facilitators of learning specifically on science instruction. Further, the result of the study will make them aware of the factors that contribute to the success in teaching Science.

**Parents.** Through this research, the parents will positively support their children on the benefits of the Learning Science subject as part of the K to 12 curriculum.

**Students.** They would have a smooth grasp of information especially in Science subject that will be provided by the teachers, resulting to maximum learning opportunity and higher academic performance.

**Future Researchers.** They may use the findings as bases for future researchers and as a reference for productive reflection and promotion in teaching science.

## 5. Recommendations

To utilize the findings of the study, the researcher recommends the following:

- a. DepEd supervisors may conduct seminars to science teachers as to upgrade their practices in terms of the teaching methods in science.
- b. Administrators shall encourage the science teachers to maximize the utilization of the laboratory apparatus, equipment and other teaching resources to enhance the ability of educators to efficiently and accurately manage, analyze and use education data. Construct standard laboratory room with complete laboratory apparatus so as the teachers and students could have the appropriate venue for experimentation.
- c. Teachers may grow professionally by pursuing graduate studies aligned to their field of specialization. They may also build opportunities for professional learning around sharing Science Curriculum ideas and best practices, co-creating and sharing learning and teaching resources and learning new teaching strategies.
- d. Future researchers are encouraged to conduct the same study but in a different setting. This is suggested for constant Science of Teaching research in education which leads to the better implementation of Science Instruction in the country.

## References

- [1] American Federation of teacher. (2018).Standards for Teacher Competence in Educational Assessment of Students .Retrieved from <http://buros.org/standards-teacher-competence-educational-assessment-students> February 24, 2018.
- [2] Annenberg Foundation. (2017). Retrieved on October 12, 2017, from <https://www.learner.org/resources/series90.html>
- [3] Barberos et al .(2017). The effect of teachers’ teaching style on students’ motivation. Retrieved on October 5, 2017 , from [teinhardt.nyu.edu/teachlearn/research/action/motivation](http://teinhardt.nyu.edu/teachlearn/research/action/motivation)
- [4] Begum S. (2012). Role of a teacher in 21<sup>st</sup> century. Retrieved on October 17, 2017, from <http://www.thecriterion.com/V3/n3/Vitthal.pdf>
- [5] Brawner (2011). Science framework for philippine basic education. Retrieved on September 17, 2017 from [http://www.sei.dost.gov.ph/images/downloads/publ/sei\\_scibasic.pdf](http://www.sei.dost.gov.ph/images/downloads/publ/sei_scibasic.pdf)
- [6] Bidabad et al (2016) Effective Teaching Methods in Higher Education: Requirements and Barriers retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5065908/> Feb. 24, 2018
- [7] Brunette F. (2015). The why and how of classroom management. Retrieved on October 4, 2017 from <http://www.kean.edu/~tpc/Classroom%20Management/THE%20WHY%20AND%20HOW%20OF%20CLASSROOM%20MANAGEMENT.htm>
- [8] Bullis B. (2014). The perceived impact of teacher performance ratings on the teacher evaluation process. Retrieved on September 15, 2017 from [http://ecommons.luc.edu/cgi/viewcontent.cgi?article=1888&context=luc\\_diss](http://ecommons.luc.edu/cgi/viewcontent.cgi?article=1888&context=luc_diss)
- [9] Bwendo (2015). The effect of educational qualification on job performance: the case of Social Security Commission in Namibia (SSC): Retrieved on September 15,2017 from <http://hdl.handle.net/11070/1441>
- [10] Cole.(2010).The very best methods for the secondary science Retrievedfrom<https://www.slideshare.net/Jovanne/the-very-best-methods-for-the-secondary-sence-4609374> February 23, 2018
- [11] Concordia Online education Curriculum. (2013). 5 Time Management Tips for Teachers Retrieved on September 14, 2017 from <https://education.cu-portland.edu/blog/educator-tips/five-time-management-tips-for-teachers/>
- [12] Dial. (2008). The effect of teacher experience and teacher degree levels on student achievement in mathematics and communication arts. Retrieved on February 28, 2018 from [https://www.bakeru.edu/images/pdf/SOE/EdD\\_Theses/Dial\\_Jaime.pdf](https://www.bakeru.edu/images/pdf/SOE/EdD_Theses/Dial_Jaime.pdf)
- [13] Education Count (2018). Retrieved on Feb. 22, 2018 from <https://www.educationcounts.govt.nz/publications> retrieve
- [14] Edutopia. (2008). Why Is Teacher Development Important?: Because Students Deserve the Best. Retrieved on February 26, 2018 from <https://www.edutopia.org/teacher-development-introduction>
- [15] Gablinske P.B. (2014). A Case Study of Student and Teacher Relationships and the Effect on Student Learning. Retrieved from [digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1284&context=oa\\_diss](http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1284&context=oa_diss) February 25, 2018
- [16] Gill E. (2013). What is Your Teaching Style? 5 Effective Teaching Methods for Your Classroom. Retrieved from <https://education.cu-portland.edu/blog/classroom-resources/5-types-of-classroom-teaching-styles/>. February 28, 2018
- [17] Gleaton T. (2012). Benefits of positive student-teacher relationships. Retrieved on October 17, 2017 from <https://www.pridesurveys.com/index.php/blog/4-beneficial-effects-of-student-teacher-relationships/>
- [18] Goh S. (2012). Investigating Science Teachers’ Understanding and Teaching of Complex Systems Retrieved October 26, 2017 from <http://repository.upenn.edu/cgi/viewcontent.cgi?article=2867&context=edissertations>
- [19] Greenberg et al. (2014). Training our Future Teachers. Retrieved October 17, 2017 from [https://www.nctq.org/dmsView/Future\\_Teachers\\_Classroom\\_Management\\_NCTQ\\_Report](https://www.nctq.org/dmsView/Future_Teachers_Classroom_Management_NCTQ_Report)

- [20] Helsinki. (2006). Teacher Education, School Effectiveness and Improvement A Study of Academic and Professional Qualification on Teachers' Job Effectiveness in Nigerian Secondary Schools. Retrieved from <http://ethesis.helsinki.fi/julkaisut/kay/sovel/vk/ololube/teachere.pdf> February 28, 2018
- [21] Herr. (2007). The Sourcebook for Teaching Science. Retrieved on September 27, 2017 from <https://www.csun.edu/science/ref/theory-research/theories-science-education.html>
- [22] Ihejiamaizu & Ochiu. (2012). UTILIZATION OF BIOLOGY LABORATORY EQUIPMENT AND STUDENTS' ACADEMIC PERFORMANCE IN CROSS RIVER STATE, NIGERIA . Retrieved from <http://www.eajournals.org/wp-content/uploads/Utilization-of-biology-laboratory-equipment-and-students-academic-performance-in-cross-river-state-Nigeria-1.pdf> February 24, 2018
- [23] Jalbani. (2014). The Impact of Effective Teaching Strategies on the Students' Academic Performance and Learning Outcome Retrieved on October 28, 2017 from <http://www.grin.com/en/e-book/300046/the-impact-of-effective-teaching-strategies-on-the-students-academic-performance>
- [24] Jalmasco. (2014). Science education realities by The Manila Times May 28, 2014: Retrieved on October 4, 2017 from <http://www.manilatimes.net/science-education-realities/100096/>
- [25] Jones A. G. (2015) the relationship between elementary teachers' years of experience and their self-perceived pedagogical competence in alabama elementary schools by . Retrieved on February 28, 2018 from <http://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=2097&context=doctoral>
- [26] Joyce (2012). CLASSIFICATION OF TEACHING METHODS IN SCIENCE EDUCATION Pedagogical Approaches: Teaching Methods and Learning Strategies. Retrieved from <http://www.edu.helsinki.fi/luovi/temp/teachingmethods.shtml>
- [27] Kaptan. K.(2012). Challenges for Science Education. Retrieve on October 4, 2017 from <http://www.sciencedirect.com/science/article/pii/S1877042812033757>
- [28] Kaufman S. and Sandilos L. (2017). Improving Students' Relationships with Teachers to Provide Essential Supports for Learning. Retrieve on October 5, 2017 from <http://www.apa.org/education/k12/relationships.aspx>
- [29] Kelly. (2017). Top 10 Concerns of Science Teachers : Retrieved on October 4, 2017 <https://www.thoughtco.com/concerns-of-science-teachers-8180>
- [30] Kini T. and Podolsky A.(2018). Does Teaching Experience Increase Teacher Effectiveness? Retrieved from [https://learningpolicyinstitute.org/sites/default/files/product-files/Teaching\\_Experience\\_Report\\_June\\_2016.pdf](https://learningpolicyinstitute.org/sites/default/files/product-files/Teaching_Experience_Report_June_2016.pdf) February 28, 2018
- [31] Kirkpatrick. (2012). Teacher Perceptions of Their Science Teaching and Student Learning for Diverse Learners Retrieved on October 24, 2017 from [http://trace.tennessee.edu/cgi/viewcontent.cgi?article=2564&context=utk\\_graddiss](http://trace.tennessee.edu/cgi/viewcontent.cgi?article=2564&context=utk_graddiss)
- [32] Koedel et al. (2015). The Impact of Performance Ratings on Job Satisfaction for Public School Teachers National Academies Press.(2017). Science teachers' Learning: Enhancing Opportunities, Creating Supportive Contexts. Retrieved on October 5, 2017 from <https://www.nap.edu/read/9847/chapter/5#58> <http://www.officialgazette.gov.ph/2004/04/21/republic-act-no-9293/>
- [33] National Academies Press. (2017). Chapter5 Assessment in Science Education Retrieved on October 5, 2017 from <https://www.nap.edu/read/4962/chapter/7#78>
- [34] Nelson J. (2012). Effects of teacher evaluations on teacher effectiveness and student achievement. Retrieved on October 27, 2017 from [https://www.nmu.edu/education/sites/DrupalEducation/files/UserFiles/Nelson\\_Julie\\_MP.pdf](https://www.nmu.edu/education/sites/DrupalEducation/files/UserFiles/Nelson_Julie_MP.pdf)
- [35] NESSIPBAYEVA (2012) THE COMPETENCIES OF THE MODERN TEACHER retrieved from <https://files.eric.ed.gov/fulltext/ED567059.pdf> February 24, 2018
- [36] Official Gazette. (2014). Philippine Professionalization of Teachers Act of 1994. Retrieved on September 24, 2017 from
- [37] Official Gazette. (2013). Republic Act No. 10612. Retrieved on September 24, 2017 from <http://www.officialgazette.gov.ph/2013/08/23/republic-act-no-10612/>
- [38] Official Gazette. (2015). The 1987 Constitution of the Republic of the Philippines-Article XIV. Retrieved September 24, 2017 from <http://www.officialgazette.gov.ph/constitutions/the-1987-constitution-of-the-republic-of-the-philippines/the-1987-constitution-of-the-republic-of-the-philippines-article-xiv/>
- [39] Odsys. (2017). 50 Innovative Teaching Methods in Science. Retrieved from <https://www.edsys.in/innovative-science-teaching-methods/> February 28, 2018
- [40] Okoye N. et al. (2013). Teachers' Quality, Instructional Strategies and Students' Performance in Secondary Science. Retrieved October 2, 2017 from <http://www.freepatentsonline.com/article/Journal-Instructional-Psychology/181365769.html>
- [41] Osamwonyi E. (2016). In-Service Education of Teachers: Overview, Problems and the Way Forward. Retrieved on September 17, 2017 from <files.eric.ed.gov/fulltext/EJ1115837.pdf>
- [42] Pattnaik C. (2014). METHODS OF TEACHING SCIENCE. Retrieve October 2, 2017 from [http://ddceutkal.ac.in/Syllabus/MA\\_Education/Education\\_Paper\\_5\\_SCIENCE.pdf](http://ddceutkal.ac.in/Syllabus/MA_Education/Education_Paper_5_SCIENCE.pdf)
- [43] Policy Guidelines on the Implementation of Grades 1 to 10 Basic Education Curriculum (BEC) Effective School Year 2012-2013. (n.d). DepEd Order No.31, s.2012 from <http://www.deped.gov.ph/>
- [44] Professional Learning Board Online Continuing Education. (n.d). Retrieved on September 14, 2017 from <https://k12teacherstaffdevelopment.com/tlb/courses/newsletter/>
- [45] Reis da Luz F. S. (2015). The Relationship between Teachers and Students in the Classroom: Communicative Language Teaching Approach and Cooperative Learning Strategy to Improve Learning. Retrieve from <vc.bridgew.edu/cgi/viewcontent.cgi?article=1020&context=theses> February 25, 2018

- [46] Rice K. (2010). The Impact of Teacher Experience Examining the Evidence and Policy Implications. Retrieved from <https://www.urban.org/sites/default/files/publication/33321/1001455-The-Impact-of-Teacher-Experience.PDF>. February 28, 2018
- [47] Schroeder C. (2015). Effective K-12 Science Instruction Elements of Research-based Science Education. Retrieve on September 12, 2017 <http://cmse.tamu.edu/documents/LittlegreenBookletv3.pdf>
- [48] Socrates Programme. (2010). Improving Quality of Science teacher Training in European Cooperation- E- learning. Retrieved on September 14, 2017 from <http://www.iqst.upol.cz/e-learning/m4/e-learning-m4-u2.php>
- [49] Springer. (2014). The Impact of Performance Ratings on Job Satisfaction for Public School Teachers. Retrieved on September 15, 2017 from [https://peabody.vanderbilt.edu/research/tnedresearchalliance/files/The\\_Impact\\_of\\_Performance\\_Ratings\\_on\\_Job\\_Satisfaction\\_for\\_Public\\_School\\_Teachers\\_.pdf](https://peabody.vanderbilt.edu/research/tnedresearchalliance/files/The_Impact_of_Performance_Ratings_on_Job_Satisfaction_for_Public_School_Teachers_.pdf)
- [50] Stanovich P. (2010). Using Research and Reason in Education: How Teachers Can Use Scientifically Based Research to Make Curricular & Instructional Decisions. Retrieve October 12, 2017 from [https://www.nichd.nih.gov/publications/pubs/Pages/using\\_research\\_stanovich.aspx](https://www.nichd.nih.gov/publications/pubs/Pages/using_research_stanovich.aspx)
- [51] Staver J. (2014). Teaching Science. Retrieved on September 17, 2017 from [http://www.ibe.unesco.org/fileadmin/user\\_upload/archive/Publications/educationalpracticesseriespdf/Practice\\_17.pdf](http://www.ibe.unesco.org/fileadmin/user_upload/archive/Publications/educationalpracticesseriespdf/Practice_17.pdf)
- [52] Unal Z. The Impact of Years of Teaching Experience on the Classroom Management Approaches of Elementary School Teachers. (n.d). Retrieved from <https://files.eric.ed.gov/fulltext/ED533783.pdf> February 26, 2018
- [53] Virginia Department of Education. (2015). Guidelines for Uniform Performance Standards and Evaluation Criteria for Teachers. Retrieved September 24, 2017 from [http://www.doe.virginia.gov/teaching/performance\\_evaluation/guidelines\\_ups\\_eval\\_criteria\\_teachers.pdf](http://www.doe.virginia.gov/teaching/performance_evaluation/guidelines_ups_eval_criteria_teachers.pdf)
- [54] Wagner (2017). Instructional Support System. Retrieved on October 4, 2017 from <http://www.ride.ri.gov/InstructionAssessment/InstructionalInitiativesResources/InstructionalSupportSystem.aspx>
- [55] Wang H. (2012). A New Era of Science Education: Science Teachers' Perceptions and Classroom Practices of Science, Technology, Engineering, and Mathematics (STEM) Integration Retrieved October 27, 2017 from [file:///C:/Users/lenovo/Downloads/Wang\\_umn\\_0130E\\_12555.Pdf](file:///C:/Users/lenovo/Downloads/Wang_umn_0130E_12555.Pdf)
- [56] Wile E. (2013). The Skills That a Teacher Needs to Possess Retrieved September 14, 2017 from <http://woman.thenest.com/skills-teacher-needs-possess-3089.html>
- [57] Wheeler. (2014). The Pedagogy Of John Dewey: A Summary by teach thought staff Retrieved October 5, 2017 from <https://www.teachthought.com/learning/pedagogy-john-dewey-summary>
- [58] Yunus M. et al. (2017). Teacher-student relationship factor affecting motivation and academic achievement in ESL classroom Retrieve on October 17, 2017 from <http://www.sciencedirect.com/science/article/pii/S1877042811007075>
- [59] Zuulke L. (2010). RELATIONSHIPS AMONG SCIENCE TEACHER QUALIFICATIONS,