

**TEACHING COMPETENCE AND CHALLENGES ENCOUNTERED IN SECONDARY SCIENCE INSTRUCTION*****Florafel C. Datoy**

Bohol Island State University, Main Campus, Tagbilaran City, Bohol, Philippines

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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 concluded that teaching methods and number of years in teaching affect the teaching competence. Hence, it is recommended, that DepEd Personnel should utilize that findings of this study and consider the proposed enhancement plan for the improvement of teaching competence in science instruction.

Keywords: Teaching Competence and Challenges Encountered in Secondary Science Instruction

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 is a need for training and evaluation of teachers to enhance their competence, and this calls for specific targets with which to build the training. Many educators and graduate student researchers have identified several factors 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. In the Trends in International Mathematics and Science study in 2003, the last time the Philippines participated in this assessment, it scored 378 and ranked 34th out of 38 countries (HS II Math) and 43rd out of 46 (HS II Science). The quality of math and science education is somewhat better in higher education. The Philippines ranked 67th 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 79th out of 138 for 2016-2017. In this scenario, the researcher believed it is important to assess the science instruction of the public high 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.

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

***Corresponding Author: Florafel C. Datoy**

Bohol Island State University, Main Campus, Tagbilaran City, Bohol, Philippines.

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 may have social, health, or environmental impacts (Brawner, 2011). Active learning is a set of strategies that posits the responsibility for learning with the student. Discovery learning, problem-based learning, experiential learning, and inquiry-based instruction are examples of active learning. 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) talked about how children learn best when they interact with their environment and are actively involved with the school curriculum. He further argued that for education to be at its most effective, children should be given learning opportunities that enable them to link present content to previous experiences and knowledge. This approach led later to a number of other similar approaches such as problem-solving learning and inquiry-based learning. Notwithstanding, Dewey was wary of placing too much emphasis on the child's abilities, but preferred to place his trust in a more balanced approach to education where teacher, students and content were given equal importance in the learning equation. Ultimately, his belief was that teachers should not be in the classroom to act simply as instructors, but should adopt the role of facilitator and guide, giving students the opportunities to discover for themselves and to develop as active and independent learners. In some schools, a return to these values is long overdue (Wheeler, 2014). Benjamin Bloom and his team of researchers wrote extensively on the subject, particularly on the six basic levels of cognitive outcomes they identified – knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom's taxonomy is hierarchical, with 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, and is particularly applicable to the teaching and learning of science. Piaget suggested that through accommodation and assimilation, individuals construct new knowledge from their experiences. Constructivism views learning as a process in which students actively construct or build new ideas and concepts based upon prior knowledge and new information. The constructivist teacher is a facilitator who encourages students to discover principles and construct knowledge within a given framework or structure. Throughout this book we emphasize the importance of helping students connect with prior knowledge and experiences as new information is presented, so they can dispense with their misconceptions and build a correct understanding. Seymour Papert, a student of Piaget, asserted that learning occurs particularly well when people are engaged in constructing a product. Papert's approach, known as constructionism, is facilitated by model building, robotics, video editing, and similar construction projects (Herr, 2007). 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 (Socrates Programme, 2010). Aside from the theories mentioned, this study is also anchored 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 as well as 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 states that:

Through this policy, the DepEd fully supports the continuing professional development of its teaching personnel based on the principle of lifelong learning and DepEd's commitment to the development of teachers potential aimed towards their success in the profession. This can be done through the school-based LAC, which primarily functions as a professional learning community for teachers that will help them improve practice and learner achievement.

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. This agency endeavors also to promote quality teachers through in-service training and continuous education.

In order for one to be accepted in the teaching profession, he/she must pass the Licensure Examination for Teachers (LET) to be given by PRC. Also, there is 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 and present data to document performance that is based on well-defined job expectations. They provide a balance between structure and flexibility and define common purposes and expectations, thereby guiding effective instructional practice. The performance standards also provide flexibility, encouraging creativity and individual teacher initiative. The goal is to support the continuous growth and development of each teacher by monitoring, analyzing, and applying pertinent data compiled within a system of meaningful feedback. 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 causally affect their 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 effect 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 teachers are 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 number 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 are more likely to 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* found out 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 bearing on job performance. The higher the education level, the more are the effects of education and skill on job performance. As such people's ability to understand and use advanced technology is determined by the level of their education. The educated workers tend to be more responsive in receiving instructions and doing new tasks and easily adopt new technology. However, the main factors considered to limit the positive effect of educational qualifications on job performance at the workplace include the quality of the work environment, organizational structure and processes, the assignment of employees in posts which did not match their qualifications and the lack of incentive systems. The need for in-service education of teachers cannot be underestimated. It is a necessity in enhancing work performance and motivation of teachers in the field. Absence of in-service training of teachers will retard professional growth of teachers as well as "missing gaps" between demands and actual achievement levels. In service education allows for such activities that may include seminars, workshops, conferences, classes, exhibitions etc that are designed to develop and improve employees in an organization from the initial employment stage to retirement.

From the foregoing statement, it becomes imperative that every attention should be devoted to the in-service education of teachers to promote their professional growth and development (Osamwonyi, 2016). Ongoing professional development keeps teachers up-to-date on new research on how children learn, emerging technology tools for the classroom, new curriculum resources, and more. The best professional development is ongoing, experiential, collaborative, and connected to and derived from working with students and understanding their culture (Edutopia, 2008).

The instructional support system combines curriculum, assessment, instructional practice tools, and student data for educators and administrators into one online system. It also supports districts, schools, and teachers to make data-driven decisions that improve student learning, and facilitates research to increase student achievement and close achievement gaps. 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 allowed students to interact and understand science concept. Ochiu and Ihejiamazu (2016) also added that the use 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 determine what preconceptions and knowledge the students bring to the classroom, what concepts and skills they need to learn, and what support structures need to be provided in order for them to meet the learning goals. It is the role 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 different methods of investigation in different circumstances. Exploring each type of investigation with students helps them to understand how scientists work and the nature of science. Models and modeling

play a crucial role in science practice. Most models are limited or 'wrong' in some key aspect. This can create learning problems if students take a different meaning from the model than that intended by the teacher. When scientists investigate, they draw on the full complexity of their current understandings of science. Students cannot be expected to do the same and will seldom be able to create genuinely new science knowledge, but they can gain a feel for disciplined enquiry. The role of the teacher is to help students learn where the products of science came from (that is, how those products originated as specific types of knowledge). 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 the common heritage of humankind. It is the only treasure of humankind that can provide a possible remedy to conquer inequality and to bring about an acceptable quality of life and a purpose, for a majority of the people of the world. Some of the main problems that should be overcome for a sustainable and proper science education are: 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 for science education 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 account for the low performance in science of the Filipino students include the lack of support for a scientific culture reflected in the deficiencies regarding the school curriculum, the inadequate teaching learning process, insufficient instructional materials and lack of teacher training. For instance, the lack of good and engaging textbooks and lack of science equipment have hindered the conduct of 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. For example, a teacher must set up an efficient filing system so that Individualized Education Plans, memos, assessments and other important papers can be easily located. 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. The teachers themselves need to develop their skills and personality to justify their job. 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 has always been imparting content in classrooms, designing syllabus and assessing students objectively. But today, teacher's role has become multi-dimensional. In addition to the 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, there is a need 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. Conversely, when students are successful and actively engaged in their work, they tend to be well behaved. Therefore, one should keep students involved in their work, have students understand what is expected of them, maximize time on task, prevent confusion or disruption, and run a work simulated but relaxed and pleasant classroom. One should remember that in the adult world the workplace is one that is not always quiet; on the contrary, people continually interact, ask questions, brainstorm, seek help and so on. In accepting the premise that all that the teacher does in the classroom contributes to quality instruction and management, instruction and classroom management should not be viewed as separate entities. When teachers apply their knowledge, training, communication mastery, skills and values and caring, they coalesce and the student cooperatively become an active part of the teacher/learning process (Brunette, 2015). Working as a teacher requires excellent time management skills. Teachers need to balance the long-term goals of the classroom, the immediate educational needs of the students and the large volume of paperwork that comes with every assignment. Between writing lesson plans, grading exams and actually teaching, teachers often feel that it is impossible to fit everything into the allotted time frame.

Although the career path seems to have too much work for the number of hours in a day, it is possible to manage the situation and clear extra time in the classroom and outside of class. With effective time management skills, teachers can increase their productivity 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 classroom management system has a positive effect not only on reducing disruptive behavior but also on improving academic scores (Oliver *et al.*, 2011; Wong and Wong, 2001). Research indicates that the more time students spend actively engaged in learning activities the higher their academic performance (Wong and Wong, 2001). Teachers with good classroom management skills increase both student engagement and success. Assessment should be aligned with curricular goals, be consistent with pedagogy, be draw from a

variety of source and feasible. Students should 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 effective, to the extent that a teacher's decisions and judgments are informed by the information they glean from their student (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 receives more constructive guidance and praise. Students who likely trust their teacher show more engagement in learning, behave in class and achieve at higher levels academically. Positive teacher-student relationships draw students into the process of learning and promote 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 can be extremely beneficial at all levels of an educational establishment, within the classroom and across the school environment as a whole. From improved self-esteem to increased engagement, there are a number of benefits of establishing positive student-teacher relationships between educators and pupils of all ages. Educators and students can experience these benefits with the use of methods that include communicating positive expectations, demonstrating caring, 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 need to understand that in many schools, students come from different cultures and backgrounds and each student deserves to be respected as an individual and their needs vary from one another. 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 life lessons. Therefore, it is necessary for future teachers to be exposed with such awareness as preparations before they go out into the real world. Research overseas has shown 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 a simple task, but reflection reveals that it is a complex challenge requiring educators to use specific knowledge and skills. Standards-based reform has many curricular and instructional prerequisites. The curriculum must represent the most important knowledge, skills, and attributes that schools want their students to acquire because these learning outcomes will serve as the basis of assessment instruments. Likewise, instructional methods should be appropriate for the designed curriculum. Teaching methods should lead to students learning the outcomes that are the focus of the assessment standards. Standards- and assessment-based

educational reforms seek to obligate schools and teachers to supply evidence that their instructional methods are effective. Evidence of instructional effectiveness used by teachers lead to student achievement. The science of teaching science encourages K-12 teachers to explore ways to improve that teaching practice. It takes an in-depth look at the real classroom so that teachers can focus on the issues involved in teaching science. Observing other teachers in unrehearsed situations will provide new and veteran teachers with the confidence 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 new teachers entering the profession. Science teachers' learning needs shape their preparation, the grades and content areas they teach and the contexts in which they work. Closing the gap between the new way of teaching science and current instruction require individual teacher's to attend their learning needs, as well as to the 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*, did not produce the expected positive significant relationship with achievement in science. Most science teachers in Nigeria tend to be at home with the guided discovery strategy being relatively oriented with its process approach to science teaching. Students exposed to concept mapping strategy of teaching performed significantly better than those exposed to the guided discovery. This means that each of these independent variables positively influenced students' ability to learn important concepts in science and this should be noted by science teachers while teaching so as to produce the desired results.

Barberos (2017) revealed on 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 on student, using instructional materials that were easy to understand, and presenting the lessons in many ways and students were able to understand the way their Science teachers explained 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. With the passage of time, the importance of instructors' teaching style is being spread and the teachers are taking initiative to improve their teaching strategies for students' improved learning by getting enrolled in such programmes which help them reflect upon their teaching practices and improving them as per requirement. The teachers who are willing for professional development in this area are able to deliver even complex and complicated content effectively, helping the students generate their interest and

eagerness for more opportunities of learning in a conducive environment, making all the individuals feel that they are being taught in their own unique way being unique themselves. 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 difference between professionally certified teachers and temporary certified teachers at the high SES level. No significant difference in eighth grade student mean Science FCAT scores was shown at either SES level among teachers with different years of experience or with science subject certification or without science subject certification. The findings suggest that when compared to high SES students, teachers without professional certification do not assist low SES students in realizing achievement in science. The differential impact of certification type on high and low SES students may be indicative of how achievement gaps are sustained in middle schools.

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 perceptions and classroom practices focused on certain qualities of STEM integration, 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; few teachers had prior knowledge of this domain and certain complex system ideas appeared better understood than others. It was also found that complex system ideas were conveyed in science lessons but the extent the ideas were taught was uneven. These ideas were conveyed more often in biology than in chemistry and physics, and certain ideas were more explicitly taught. Teachers with better complex system understanding were also better able to convey these ideas in their lessons.

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 views 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 meet 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.

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.

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 conducted in identified secondary schools in the First District in Bohol. The participants of the study 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 number 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 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 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.

FINDINGS

The study revealed the following findings:

Profile of the Secondary School Science Teachers

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.

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.

Teaching Experience in Science: Out of seventy-two respondents, 18(25.096%) had 1-7 years 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.

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.

Extent of the Utilization of the Instructional Support System

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

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

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".

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.

Teaching Competence as Perceived by the Science Teachers, students and principal

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.

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”.

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

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.

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.

Relationship of teaching competence on

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

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

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

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

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

Conclusion

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.

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