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RESEARCH ARTICLE

TEACHER'S COMPETENCE IN TEACHING BIOLOGY IN SELECT SCHOOLS IN ISABELA

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Abstract

This study aimed to assess the competence levels of biology teachers in San Mariano and Benito Soliven schools during the 2019-2020 academic year. Employing a quantitative research approach, the study utilized a descriptive-comparative method. Data were collected through two main techniques: administering a test covering Biology content for Grades 7 to 10 and conducting a survey on instruction and assessment practices. The quantitative analysis described respondent profiles and competence levels, with comparisons based on selected profile variables. Frequency and percentages were used to analyze profile data, while correct response computations and percentages were employed to assess competence levels in content. Likert scales were utilized to evaluate instructional and assessment competence. Findings indicated that teacher-respondents achieved an average score of 67.22, qualifying as competent in subject content. Instructional competence received an overall mean rating of 2.42, indicating slight competence, while assessment competence garnered a weighted mean of 2.77, signifying competence. Despite overall competence in instruction and assessment, slight deficiencies were noted in content competence. Therefore, the study recommended providing teachers with opportunities for seminars, training, and workshops to update their knowledge and pedagogical approaches in line with current teaching trends. Such initiatives would enhance teacher effectiveness and ensure alignment with evolving educational standards and methodologies.

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INTRODUCTION

Biology, the study of all living organisms, from the tiniest microorganisms to the largest life forms, delves into how these entities exist, function, and interact with their environment. The pivotal role of biology in fostering scientific attitudes, logical reasoning, environmental awareness, and respect for life among students. This underscores the significance of biology in shaping individuals' perspectives and understanding of the world.

With the integration of Biology into the K-12 curriculum alongside Physics, Chemistry, and General Science, science textbooks have evolved to encompass a holistic approach. The importance of coherence in High School biology textbooks ensures that scientific concepts

are effectively communicated to students. The content of upper primary science textbooks, comprising various elements such as terms, facts, principles, and illustrations, plays a crucial role in elucidating Biology concepts in the classroom (Vlčková et al., 2019).

Teachers are vital in imparting biology content knowledge and ideologies to students. Their content delivery, assessment, and instruction competence are essential for quality education. Manzanares and Linaugo (2022) highlight the significance of proficiency in Biology among Grade 9 teachers, emphasizing the integral role of Biology in the secondary-level Science curriculum in the Philippines. In conclusion, the combination of research findings and educational practices underscores the pivotal role of Biology in education. By equipping teachers with the necessary competencies and resources, the field of Biology can continue to inspire and educate students, fostering a deeper understanding of life and the natural world.

The study analyzes teachers' competence in biology education, focusing on content knowledge, instructional skills, and assessment practices. To identify areas of strength and improvement for teachers, the study analyzes teacher content competence scores, assesses instructional competence across multiple dimensions, and evaluates teachers' proficiency in designing and implementing educational assessments.

METHODOLOGY

This study used a descriptive-comparative research methodology to examine the competence levels of biology teachers in San Mariano and Benito Soliven schools during the 2019-2020 academic year. Two primary methods were used in the data collection. First, a test covering biology content from Grades 7, 8, 9, and 10 was administered, focusing on topics related to living things and the environment. This test aimed to assess teachers' understanding and mastery of subject matter. A survey was conducted to gather information on teachers' instructional methodologies and assessment practices. In addition to evaluating teachers' content knowledge, this survey assessed their instructional and assessment competence.

Quantitative data was analyzed to describe respondent profiles and their levels of competence in content, instruction, and assessment. In order to analyze profile variables, statistical tools such as frequency counts and percentages were used. Meanwhile, teachers' competence level in content, instruction, and assessment was evaluated quantitatively by computing mean scores or weighted averages based on the responses to the test and survey. Utilizing a quantitative approach and specific data collection techniques, this study evaluated teachers' competencies in various aspects of biology instruction systematically and objectively. Consequently, this study's methodological rigor enhances the validity and reliability of its findings (Pentang, 2023), providing valuable insights for educational stakeholders wishing to improve biology education in the region.

RESULTS AND DISCUSSION

As shown in Table 1, teachers' levels of content competence in teaching biology are distributed in frequency and percentage. A score range from 40 to 80 is presented, along with a description of the level of competence associated with the score. Regarding content competence, no teachers scored 40-49, indicating a lack of poor performance. Most teachers, 56%, scored in the range of 60-69, demonstrating competence in content

knowledge. Furthermore, 12% of the teachers scored in the 50-59 range, indicating slight competence, while 30% scored in the 70-79 range, indicating highly competent performance. A teacher achieved an outstanding score of 80, indicating exceptional content knowledge.

In general, the average score of 67.22 suggests that, on average, teachers are competent in content knowledge, with the majority falling within the range of 60-69. The teacher-respondents have a satisfactory understanding of the relevant content, crucial for practical instruction and student learning in biology. Despite this, there is still room for improvement, particularly among the teachers who scored slightly lower, as evidenced by the presence of some teachers who scored between 50 and 59. Thus, targeted professional development opportunities may enhance teachers' content competency, thus ensuring high-quality biology education delivery in San Mariano and Benito Soliven, Isabela.

The findings highlight that a small percentage of teachers, 2.0%, demonstrated a very high level of competence by achieving a perfect score. The average score of 67.22 across all respondents further supports the notion that teachers exhibit a commendable level of competency in their roles (Garton & Chung, 1997). These results are consistent with existing literature on teacher competence and professional development. Studies such as those by Wu (2022), Mustafa (2013), and Gholami et al. (2019) emphasize the importance of developing competency models for teachers based on robust assessment methodologies to ensure accurate evaluations of their proficiency levels. Moreover, the study by Rizki et al. (2023) underscores the positive impact of teacher competence on work performance, highlighting the interconnectedness of competence, motivation, and overall effectiveness in educational settings.

Table 1. Frequency and Percentage Distribution on Level of Content Competence of Teachers

Scores	Frequency	Percent	Description
40-49	0	0.0	Poor
50-59	6	12.0	Slightly Competent
60-69	28	56.0	Competent
70-79	15	30.0	Highly Competent
80	1	2.0	Outstanding
Total	50	100.0	
Average	**67.22**		**Competent**

In Table 2, the weighted mean scores and corresponding descriptions of the competencies of respondents are presented. There are four categories of competency: Methodological Competencies, Instructional Motivational Competencies, Material Selection and Utilization Competencies, and Instructional Process Competencies. Based on the weighted mean scores for each dimension, the overall weighted mean score is 2.42. Based on these results, respondents demonstrate a moderate level of competency across all instructional dimensions. Based on the weighted mean of the respondents, Methodological Competencies were scored at 2.36, indicating a limited level of competency. As a result, even though teachers possess some skills and knowledge in instructional methods, there may still be room for improvement.

In addition, Instructional Motivational Competencies received a weighted mean score of 2.44, which indicates a slight level of competence. Although teachers are somewhat effective in motivating students, there is room for improvement in this area of instruction.

The weighted mean score for Material Selection and Utilization Competencies is 2.49, which indicates a somewhat competent level of performance. Teachers display some proficiency in selecting and utilizing instructional materials but may benefit from further development in this area.

In addition, Instructional Process Competencies received a weighted mean score of 2.39, indicating a slight level of competence. In this regard, teachers demonstrate some proficiency in managing instructional processes but must improve their ability to execute them effectively. The weighted mean score of 2.42 indicates a slightly competent instruction level. Even though teachers demonstrate some competence in instructional dimensions, targeted professional development opportunities may further enhance teachers' instructional practices and improve student learning outcomes.

These findings align with research by (König et al., 2021), which explores the relationship between pedagogical competence, instructional quality, and academic achievement. The study emphasizes the significance of pedagogical competence in enhancing instructional quality and positively impacting student outcomes. This underscores the importance of teachers possessing a diverse skill set to engage students and facilitate learning effectively (König et al., 2021). Moreover, the study by Nguyen et al. (2020) delves into the connections between instructional leadership and teacher competencies. The research highlights the role of instructional leadership in predicting teacher competencies related to curriculum content, pedagogy, and assessment. As Pentang (2021) emphasized, "teachers as curricularists do their best to learn available and applicable pedagogy and assessment tools to deliver and evaluate their lessons effectively". This underscores the influence of leadership practices on teacher effectiveness and instructional quality (Nguyen et al., 2020).

Table 2. Summary Table of the Weighted Mean and Description of the Competencies of the Respondents on Instruction

Instruction Dimension	Weighted Mean	Description
Methodological Competencies	2.36	Slightly Competent
Instructional Motivational Competencies	2.44	Slightly Competent
Material Selection and Utilization Competencies	2.49	Slightly Competent
Instructional Process Competencies	2.39	Slightly Competent
Total	**2.42**	**Slightly Competent**

Table 3 summarizes biology teachers' competence level in terms of assessment. Across all competence items, the weighted mean score ranges from 2.6 to 3, indicating a generally competent level of performance. During different stages of teaching activities, the first competency involves using various assessment procedures to gauge student learning effectively. It was demonstrated that teachers were competent at utilizing various assessment methods and interpreting assessment results to guide their instructional planning and revision efforts. In addition, they conducted regular assessments, kept accurate records of student progress, and provided timely feedback to students.

Additionally, teachers demonstrated competence in building valid and reliable test items, incorporating differentiated assessment strategies to meet the needs of diverse learners, and aligning assessment methods with instructional objectives. They also demonstrated

proficiency in administering, measuring, and interpreting assessment results objectively and communicating them to students, parents, and colleagues. In addition, teachers were aware of the level of formality required in assessment procedures and consistently implemented diagnostic, formative, and summative assessments throughout the teaching-learning process. Overall, the average weighted mean score of 2.77 indicates that the teacher-respondents possess competent levels of assessment competence. Even though the teachers demonstrate competency in most areas, there may still be areas for improvement, particularly in areas where the scores are slightly below the average. The data indicate the importance of continuing professional development for teachers to enhance their assessment practices and ensure effective student learning outcomes. Designing and implementing authentic assessments that measure learners' mastery of disciplinary knowledge and inquiry skills, aligning with state content standards. This underscores the significance of assessment practices that accurately gauge student learning outcomes and inform instructional decisions (Brownell et al., 2013).

Table 3. Level of Competence of Teachers in Terms of Assessment

Competence on Assessment	Weighted Mean	Description
I can use effective and appropriate educational assessment procedures considering the diversity of learners to determine whether the students are learning during different parts of teaching-learning activities in biology.	2.6	Competent
I can utilize various educational assessment procedures to determine whether my students are learning lessons in biology subject.	2.6	Competent
I can determine and consider the results of the various educational assessment procedures to guide how I plan, implement, and revise the teaching-learning activities in biology to prepare for my students.	2.7	Competent
I conduct regular assessment procedures in the teaching process of biology instruction to track each student's level of learning, such as quizzes, seatwork, and unit tests.	2.7	Competent
I can keep regularly and objectively accurate records of each student's progress and level of learning.	2.7	Competent
I provide appropriate and timely feedback for students to help them objectively monitor their learning through rubrics and other learning criteria and standards.	2.6	Competent
I can easily construct valid and reliable test items in biology courses considering the three educational dimensions/learning domains.	2.7	Competent
I can choose and utilize differentiated assessment and evaluation procedures considering the learning differences, ability, and capability of the learners' cognitive, affective, and psychomotor domains in teaching-learning biology courses.	2.7	Competent
I can develop assessment methods relevant to the instructional decisions and objectives of the lessons.	2.8	Competent
I can effectively administer, measure, and interpret objectively the results of assessment methods I employ and impose on the students during instruction, whether such method is either external or teacher-produced.	2.6	Competent
I conscientiously communicate assessment results to students, parents, and other educators regarding the student's academic achievement and performance.	3	Competent
I am aware of and consistently consider the formality of assessment and evaluation procedures in teaching biology subjects.	3	Competent
Before biology instruction, I steadily construct and administer diagnostic/placement assessments, e.g., pre-tests, etc..	3	Competent
I construct and administer constantly formative assessments, e.g., quizzes, hands-on experiences, oral presentations, and essays in the teaching-learning process.	3	Competent
I construct and administer constantly summative assessments, e.g., periodical tests, unit/chapter tests, etc., in the teaching-learning process of biology instruction.	2.8	Competent
Average	**2.77**	**Competent**

CONCLUSION

The study focused on Master of Arts in Education graduates without biology backgrounds teaching in large and mega schools in San Mariano and Benito Soliven, Isabela. Despite their non-biological majors, these teachers displayed outstanding teaching performances, as evidenced by their Individual Performance Commitment and Review (IPCRF) ratings. However, based on their performance on specific test items, approximately eight teachers needed further review of biology content. In general, they demonstrated a satisfactory level of content competency. The teacher-respondents demonstrated slight competency in instructional competencies such as Material Selection and Utilization, Instructional Motivational Competencies, Instructional Process Competencies, and Methodological Competencies.

Additional training is required to enhance instructional skills, particularly in teaching biology effectively. Regarding assessment, teachers demonstrated a general level of competence, indicating satisfactory knowledge of assessment construction. Nevertheless, there were challenges in interpreting and utilizing assessment results to guide the teaching-learning process. In light of these findings, recommendations were offered, including advocating for learning and development programs, encouraging science teachers to enhance their biology literacy through training and workshops, conducting additional research to validate findings across different contexts, providing subject-specific teacher development training, and assisting junior high school students in fostering positive attitudes toward biology through motivation and self-discipline. These recommendations aim to improve teacher competence and student outcomes within the specified schools in biology education.

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