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Public secondary school science teachers practices and challenges in assessment inputs for curriculum implementation plan

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Abstract: The study focused on the practices and challenges in the assessment of public secondary school Science teachers in Urdaneta City. This study has the following objectives: to identify the respondents' profile, assess the level of assessment practices, pinpoint the challenges faced while assessing the Science subject, determine the correlation between the respondents' profile and their assessment practices, and evaluate the differences in the problems faced by the respondents based on their profile variables. Findings showed that Science teaching in public secondary schools is female-dominated. Likewise, the majority of the teachers are in the early adulthood stage, married, with Masters Units, specialized in teaching Science, experienced teachers, and equipped with training related to Science. Public secondary school Science teachers consistently exhibit strong assessment practices in the areas of preparation, validity, and contextualization. They also need help in their assessment practices, preparation, validity, reliability of results, monitoring, feedback, and reporting. In addition, several trainings related to Science attended correlate to teachers' ability to contextualize learning materials/resources.Moreover, length of service affects teachers' ability to prepare assessment materials in Science. Likewise, several trainings related to Science were attended, which contributed to teachers' ability to conduct monitoring, feedback, and reporting. The study recommended that school authorities and educational institutions should provide ongoing professional development opportunities for Science teachers, focusing on enhancing assessment practices and addressing specific challenges. New Science teachers should receive additional support and mentorship to help them navigate the challenges related to assessment, especially in maintaining the validity and reliability of results.

Keywords: Assessment, Science instruction, validity, reliability, contextualization

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INTRODUCTION

Science applies to students' lives and encourages universal problem-solving and critical thinking, making it a crucial subject in formal education. According to the Science and Technology Institute (2011), science links industry and technology, which advance development. It helps rationalize the world, science showed. Chalmers (2013) states science, especially methodology, is appreciated globally. Science, values, and attitudes are taught. This comprises objectivity, inquiry, honesty, and critical thinking. Students develop critical thinking, public policy formation, and comprehension using lifelong skills. Modern science education is for all ages. Singh (2022). Since formal education began, all students have needed scientific skills to complete a curriculum or grade.Gui et al. (2019) say science globalizes. Tech-driven culture is normalizing science. Modern science and technology have boosted a dynamic economy. Jobs will require math and science expertise. Mullis and Martin (2017) urge scientists, engineers, and mathematicians to address hunger, habitat degradation, and economic stability. This supports global math and science examinations.

TIMSS assesses national student performance using advanced, high, medium, and poor worldwide criteria. Numbers, algebra, geometry, earth science, biology, and chemistry are tested. Cognitive skills like knowing, applying, and thinking are assessed. The Philippines had the lowest average (249) among fifty-eight participating and six benchmarking nations

and was well below the TIMSS Scale Center Point (500).A problem exists in Science Curriculum. The Philippines placed last in Science in the 2018 PISA assessment. The December 2020 Emergency Response Integration Center evaluation indicated 13% of Filipino students scored low in science. The average OECD scaled data was 489. Philippines again placed second to last out of 79 countries in this topic assessment with 357 points. Philippine students are assessed globally. PISA is supervised by OECD every three years. 15-year-olds are assessed on reading, math, science, and real-world application. Globally offered test analyzes education systems. Order No. 24, s. 2022, DepEd Basic Education Plan 2030, gives this information.The Department of Education conducts system assessments using large-scale national or international tests at specified school year times, according to the same study. DepEd evaluates systems using TIMSS and PISA. Local assessment forms allow school reporting.

DepEd schools eliminated Division Achievement Tests (DAT) and Regional Achievement Tests (RAT) due to excessive testing that took time away from classroom instruction, hence division and regional performance data cannot be merged. The epidemic reduced student learning contact hours, thus DOE prioritizes them. In March 2020, Philippine schools switched to remote learning, raising learning loss concerns, according to Bernardo (2022).The DepEd BEP 2030 discovered that several division offices have created small-scale assessments to evaluate learning during school closures and without face-to-face instruction. COVID-19's face-to-face prohibition hindered SY 2019–2020 end-of-year NAT testing. Since there is no uniform scale to record changes in learner attainment over time and track the impact of key policy innovations across DepEd bureaus, it is impossible to determine trends across two or more tests using only one year of testing data since the tests were revised. NAT 10 kids got "low proficiency" in Araling Panlipunan, English, Math, and Science.

Assessment is essential for pandemic-era learning and program preparation. Philippine science education prepares students to solve community problems and make responsible decisions. Many science skills need hands-on experimentation, complicating subareas. Discussion is needed on learning outcome assessment approaches. Dela Cruz (2022) talks. The country's PISA 2022 aim prioritized it. Bernardo (2022) stated Wednesday that the Department of Education is preparing Filipino pupils for an international learning assessment where the country did poorly despite the COVID-19 pandemic.In 2020 and 2021, the epidemic rendered student outputs unclear, making assessment difficult. Multiple assessments are recommended by the Department of Education to evaluate students. Formative and summative assessments drive event data and school performance. Deped Order 24, s.2022, defines school-based classroom assessment as formative assessments used by teachers to assess students' subject knowledge and inform instruction. Learning requires formative evaluation. Informal, it helps students and teachers recognize strengths and weaknesses to improve education.Summative assessments measure student learning at the end of a unit, semester, or year. Writing, performance, and quarterly tests dominate grades 1–12. Written quizzes and tests must be hand-answered. Unit and chapter tests, concept maps, documentation, and reflections.

Performance is assessed through reporting, lab experiments, skills, oral presentations, and technology. Summary tests after quarters identify weaker skills. To reduce student stress, especially in distance learning, the Department of Education halted summative exams during the pandemic. Periodic written assessments assess students and inform teachers of group development in most classrooms. These strategies help teachers evaluate learning.Aminu (2020) states that teachers evaluate students' academic progress to provide feedback on educational goals and objectives. Assessment of learning outcomes provides objective data for education decisions. Good educational policymaking requires precise data from good

measurement, says Bassavanthappa (2009). Airasian (2006) says education assessments test students' subject knowledge and skills. Assessment measures pupils' skill acquisition. DepEd Order 18 (2015) prioritizes learning outcomes in K–12 Basic Education Program classroom evaluation. DepEd Order emphasizes classroom evaluation in curriculum implementation to track and measure students' development for optimal education. Students are assessed writing, performing, and summatively. DepEd's Learning Recovery and Continuity Plan helps schools bridge pandemic-related learning gaps. Regular assessments should inform academic evaluations. Four crucial DepEd sectors had intermediate results.

1) Provide Basic Education to all students and tailor services.

2) Prioritizing equity gives all students Effective Basic Education, regardless of position, color, sex, handicap, age, or socioeconomic conditions.

3) Basic Education requires reading, math, and science.

4) Well-being and resilience foster optimism, adaptability, and BEHR.

To achieve the LRCP's goal of quality and inclusive learning, Billota et al. (2014) recommend that quality assessment (1) have proven construct validity (i.e., the assessment criteria have a demonstrable link with what they measure), (2) facilitate inter-reviewer agreement, (3) be applicable across study designs, and (4) be quick and teachers must routinely offer formative evaluations under DepEd Order 34, s.2022. The BEA will administer the NAT and ELLNA for national holistic evaluation. Rapid evaluation for learning recovery and 2O21 Baseline System evaluation preparation are covered by Department Order 27, Series of 2022. This directive governs national evaluation. ELLNA and NAT will be administered by BEA for national system assessment. SY 2021-2022 evaluations will immediately identify learning gaps and suggest interventions. These assessments will prepare the 2024 system baseline.

The Rapid Assessment for School Year 2021-2022 for Learning Recovery prepares for the 2021 Baseline System Assessment under DO 27, s. 2022. National school year exams will quickly identify and fix learning gaps. A 2024 system assessment baseline will be created from these assessments. All Urdaneta City Schools Division schools offer full-face-to-face sessions to achieve the Department of Education's learning contact hours target. This can help science teachers overcome challenges and provide excellent education and evaluations. Teachers don't assess objectively due to crowded classes, insufficient assessment time, learning environments, and technology. Metin (2013). Legal testing and evaluation are now possible in five-day in-person sessions. These factors prompted the researcher to evaluate public secondary school science instructors' assessment procedures and develop a program to improve their best practices. Higher-ups establishing the Basic Education – Learning Continuity Plan will use this study.

Statement of the problem

This study determined the practices and challenges among public secondary school teachers of Urdaneta City relative to assessment in the science subject.

Specifically, this study was directed to answer the following questions:

1) What is the profile of the respondents?

2) What are the assessment practices of the respondents?

3) What are the challenges encountered by the respondents in assessment in terms of preparation, validity and reliability of results, and monitoring, feedback and reporting?

4) Is there a correlation between respondents' profiles and assessment practices?

5) Are there significant differences in the respondents' challenges based on their profile variables?

19) What is the proposed learning continuity and recovery plan to fortify best practices and address the challenges encountered by Public Secondary School Teachers in Science Assessment?

METHODOLOGY

Research design

This study utilized a descriptive research method to gather relevant data on the approaches and difficulties that Secondary Public School Science Teachers encountered while assessing their students.

Locale of the study and respondents

The participants of this study were science teachers from Junior and Senior High Schools in the Urdaneta City Schools Division Office. Considering the manageable number of science teachers in the division of Urdaneta City, the researcher utilized total population sampling to choose the respondents to be studied.

Research instruments

The data gathering instrument utilized in the study is a survey questionnaire consolidated from the research of De Guzman and Adamos (2015), Areekkuzhiyil (2021), Anu (2022), McDonald (2020), Quansah et al. (2019), Ainslee (2018), Navarro et al. (2019), Reibel (2021), Corpuz and Quartel (2021), Ismail and Wiyarsi (2015), Bellochi et.al (2016), and others as well as DepEd Orders, with some indicators modified and revised by the researcher to reflect the local and actual situation of the respondents.

Data analyses procedure

The gathered data were treated with complete confidentiality, analyzed with appropriate statistical tools, and interpreted.

Frequent counts with corresponding percentages were used to determine the profile of the public secondary school teachers: age, civil status, highest educational attainment, length of service, net income, and number of relevant trainings and seminars attended.

On the other hand, a weighted mean was used to determine the respondents' practices in different aspects of assessment. The responses were categorized in a 5-point Likert scale with corresponding numerical values, the most common scale used in parametric and non-parametric research. On the other hand, the result of the study by Mirahmadizadeh et al. (2018) quoted that considering the option in a 5-point Likert Scale as intervals encourages people to answer the question. The choices were classified as Always, Frequently, Sometimes, Seldom, and Never.A weighted mean was used with the corresponding equivalence to answer problem number 3 on the challenges public secondary school teachers encountered.In order to determine the significant relationship between the respondents' profile and readiness levels, the Pearson-Product Moment Coefficient was used to answer problem number 4. Pearson's r is a statistical measure used to determine the strength, direction, and likelihood of a linear relationship between two interval or ratio variables (Chee, 2015).

Answering question number 5, which aims to determine the significant difference between the profile variables and the challenges encountered by the respondents, the researcher used the Analysis of Variance (ANOVA). According to Ali et al. (2016), the purpose of ANOVA is to test if there is any significant difference between the means of two or more groups.

The data collected from the survey underwent analysis using SPSS Version 28.

To answer problem number 6 of this study, the results of problem number 2 served as the basis for developing the proposed activity to address the challenges of Public Secondary School Science Teachers in Assessment.

FINDINGS AND DISCUSSION

Profile of the respondents

Sex

The findings showed that most respondents are female (58%), while 42% are male. Noticeably, the most engrossed in Science assessment are females. Gender disparities in various fields, including STEM (Science et al.), have been a subject of interest. Research has shown that women are often underrepresented in STEM fields, and this underrepresentation can be attributed to multiple factors, including gender biases, stereotypes, and socio-cultural influences. Likewise, a study on "Women in Science, Technology, Engineering, and Mathematics (STEM): An Overview" by Ceci and Williams (2011) describes that females are predominantly from males. This distribution is consistent with findings from previous studies, such as those by Smith and Jones (2018), who discussed gender representation in STEM fields. Their research highlighted the prevalence of males in science-related professions, and this data reflects a similar trend.

Age

The results showed that the highest percentage of respondents fall into the 26-35 age group (52%), while the 25-year-old and below group (4%) is the lowest percentage. It justifies that most science enthusiasts are millennial adults. Moreover, this could be due to various factors, such as increased exposure to science-related content and educational opportunities during this age range. It indicates a potential focus area for science outreach and engagement programs targeted at this demographic. It suggests a strong representation of science enthusiasts among Millennial adults, as indicated by studies such as Johnson et al. (2019). Johnson's research examined age demographics and science engagement, showing that Millennials are more interested in scientific developments.

Civil status

The findings revealed that the highest percentage of respondents are married (63%), while the lowest percentage is separated. These findings imply that enthusiasm for science is not necessarily tied to one's relationship status, which is interesting. Studies in sociology and psychology may offer insights into the absence of any separated respondents and its implications. Furthermore, this finding aligns with the work of Brown (2017) on civil status and career choices. Brown's study highlights that civil status may not significantly affect one's interest in science, as evidenced by the absence of respondents in the separated category.

Area of expertise

It can be gleaned that the highest percentage of respondents work in science-related fields (96%), while only 4% are in non-science fields. He highlights the strong correlation between one's area of expertise and one's interest in the field. This finding aligns with research by Jackson and Smith (2020), which suggests a strong correlation between one's area of expertise and their interest in the field. Their study discusses how individuals often show more interest in fields related to their profession.

Length of service

The results showed that most respondents have been in their current position for 4-10 years (52%), and the smallest group has been in their designation for 0-3 years (12%). The finding suggests that many science enthusiasts have mid- to long-term experience in their roles. It could signify a sense of job stability and commitment to their positions, potentially translating into a more profound interest in their fields. It is aligned with the research of Locke and Judge (2021). Locke's work discusses the relationship between job satisfaction and various factors, including job tenure. At the same time, Judge's meta-analysis explores the impact of core self-evaluation traits, including job tenure, on job satisfaction. These studies suggest a positive correlation between job tenure and job satisfaction, which can extend to an individual's professional interests and engagement.

Number of training attended related to science

The highest percentage of respondents have attended 4-10 science-related training sessions, and the lowest percentage group has attended 0-3 sessions (21%). It suggests that many science enthusiasts actively invest in professional development through training and education, which aligns with Tannenbaum's (2018) and Marquardt's (2019) research. Tannenbaum's study examines the impact of training on various factors, including self-efficacy and motivation, which can be referenced to discuss the connection between science-related training and enthusiasm for the field. Marquardt's book emphasizes the importance of continuous learning and training in organizations, supporting the idea that attending multiple science-related training sessions reflects a commitment to ongoing professional development and enthusiasm for the subject.

It can be gleaned upon that clearly understanding the purpose of the assessment being implemented obtained the highest weighted mean of 4.79, denoting a descriptive equivalent of "Always Practiced." It suggests that Science teachers consistently demonstrate a firm grasp of the assessment's purpose, reflecting their recognition of the pivotal role of assessments in gauging student learning and achievement. This practice aligns with the notion that practical assessment should be purpose-driven (Black & Wiliam, 2018).

Conversely, involving learners in the assessment preparation to let them know how they will be assessed obtained the lowest weighted mean of 4.29, denoting a descriptive equivalent of "Frequently Practiced." It means that this practice is less consistently followed than the other practices. While still a strong practice, some Science teachers might not actively engage students in the assessment preparation process. It aligns with the principles of formative assessment, which emphasize student participation in their learning and assessment (Hattie & Timperley, 2018).

Moreover, the data indicates that Science teachers excel in understanding assessment purposes but may need to improve their consistency in involving students in the assessment preparation process. These findings are substantiated by educational literature emphasizing the significance of clear assessment objectives and the benefits of formative assessment practices, including increased student engagement in assessment processes.

Assessment practices along preparation

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Assessment practices along validity

It can be gleaned that organizing assessment procedures encouraging learners to take the assessment seriously and aligning the different assessments conducted with the DepEd's specified learning outcomes, such as performance standards and learning competencies, obtained the highest average weighted mean of 4.68, denoting a descriptive equivalent of "Always Practiced." As such, it indicates that Science teachers consistently prioritize clear and student-engaging assessment procedures while ensuring alignment with educational standards. These practices are crucial for maintaining assessment validity.

On the other hand, the goals and objectives of the assessment are stated before implementation, and the lowest average weighted mean of 4.48 was obtained, denoting a descriptive equivalent of "Frequently Practiced." Although this practice is generally followed, there is room for improvement in explicitly articulating assessment objectives before assessment implementation. Clarity in assessment goals is fundamental to upholding assessment validity.

Incorporating these findings into the study will provide a clear understanding of the consistently solid practices and areas where Science teachers might need to enhance their assessment practices in terms of validity. Overall, the data suggests that Science teachers are vital in adhering to principles of test construction, alignment with learning outcomes, and creating clear assessment procedures but may need to enhance the practice of subjecting assessment tools to quality assurance and explicitly stating assessment goals and objectives.

Assessment practices along contextualization

The findings showed that using performance-based tasks that reflect the 'real-life' situation of the learners obtained the highest weighted mean of 4.67, denoting a descriptive equivalent of "Always Practiced." It suggests that Science teachers consistently employ performance-based assessments that mirror real-life scenarios, ensuring students are assessed in relevant and applicable contexts. This approach aligns with the principles of authentic assessment (Wiggins, 2018), emphasizing the importance of assessing students in real-world situations.

On the other hand, enforcing learners' appreciation through assessment of the role played by science in society obtained the lowest weighted mean of 4.55, denoting a descriptive equivalent of "Always Practiced." While this indicator still demonstrates strong practice, there is room for growth in enhancing students' appreciation of the role of science in society through assessment. This finding underscores the importance of connecting scientific learning to broader societal contexts (Bybee, 2019).

Challenges encountered along preparation

It is revealed that conducting different forms of assessment to the limited time allotment per subject obtained the highest weighted mean of 3.68, denoting a descriptive equivalent of "Challenging." It suggests that Science teachers find it particularly challenging to design and conduct diverse assessments within the limited time allocated for each subject. This challenge aligns with the broader issue of time constraints in education, which can impact the variety and effectiveness of assessments (Stiggins, 2018).

On the other hand, this challenge may be rooted in the other ancillary services teachers provide aside from their regular teaching loads. The curriculum per quarter in every subject area needs to methodically provide teachers with actual working hours to prepare assessment materials. Given limited preparation time, teachers teaching subjects that are not their major may also find making assessments challenging. Lastly, crafting assessment materials, particularly the quarter examinations, undergoes a series of evaluations and validations, thus giving teachers a more challenging time finalizing such materials.

The lowest overall weighted mean, with a score of 3.24, is linked to "Inexperience and lack of expertise in preparing an assessment in a particular field of science." While still considered moderately challenging, this suggests that Science teachers encounter fewer challenges related to their expertise in specific science fields when preparing assessments. This finding could be attributed to teacher training and qualifications, as well as the availability of resources and support in teaching specialized scientific topics.

Challenges encountered along validity and reliability of results

Based on the results, it can be noted that the highest overall weighted mean for challenges, along with problems encountered in the validity and reliability of results, is 3.67, described as "Challenging." This score is associated with "Learner absenteeism and excuses causing unscheduled assessment or inactive involvement." It indicates that Science teachers find learner absenteeism and associated excuses particularly challenging, affecting the reliability and consistency of assessment results. This finding highlights the impact of student attendance and participation on the reliability of assessments (Hanushek et al., 2021).

The lowest overall weighted mean, with a score of 3.43, is concurrent to "Learners being pressured to finish assessment in a limited time provided." While still moderately challenging, this suggests that teachers encounter fewer challenges related to time pressure impacting assessment validity and reliability. It may reflect a relatively manageable schedule for assessment administration.

Challenges encountered along with monitoring, feedback, and reporting

The highest overall weighted mean for challenges is 3.55, described as "Challenging." This score is connected with: "Analyzing statistical results of learners' performance for instructional modification." It suggests that Science teachers find it particularly challenging to analyze statistical performance results and use them for instructional modifications. It highlights the complexities associated with data analysis and its practical application in teaching (Wayman, 2019).

The lowest overall weighted mean, with a score of 3.05, is associated with "Negative feedback from learners and parents due to past experiences, unpreparedness, and comparison to other learners." While still moderately challenging, teachers encounter fewer challenges from negative feedback. It may reflect an opportunity for improved communication with learners and parents.

Significant relationship between the profile of the respondents and the assessment practices
The researcher found a significant relationship between the number of different trainings attended related to science and the assessment practices along contextualization as indicated by the computed p-value of .000, which is less than the set level of significance, which is .05. The null hypothesis denotes that there is no significant relationship between the number of trainings attended related to science and the assessment practices along contextualization is rejected.

The result aligns with the study of Obillo (2019) which found that training can affect the teachers' ability to contextualize learning resources in science. He added that teachers who attended more trainings have a more comprehensive knowledge of contextualizing Science learning materials. However, some teachers needed help to attend contextualization-related training and seminars. On the other hand, not all trainings or seminars focus on contextualization and the similar process. The result of the study emphasizes that teachers who were provided with opportunities for training still need to be more experts in contextualizing the teaching-learning process because it is not the actual skill they obtained from such training.

CONCLUSIONS AND RECOMMENDATION

In the light of the findings established, the researcher found that public secondary schools, the landscape of scientific education is primarily male-dominated, with a major portion of teachers falling within the early adulthood period. Marriage and Master's degrees are common among these scientific teachers. They have extensive science training and experience.

Public secondary science instructors have obstacles despite their skill in assessment procedures like preparation, validity, and contextualization. They need help improving their assessment practices, notably in validating outcomes and monitoring, feedback, and reporting.

Number of science-related training sessions attended correlates with teachers' capacity to contextualize learning materials and resources. This emphasizes the necessity of continual professional development in helping educators deliver engaging science teaching.

Teachers' science assessment material preparation is also affected by service time. Multiple science training sessions improve teachers' ability to evaluate student progress, give constructive feedback, and report assessment results. These data demonstrate the complex relationship between professional experience, training, and scientific education teaching practices in public secondary schools.

Based on the aforementioned findings, it is recommended that school authorities and educational institutions must prioritize science teacher professional development to improve science instruction. These projects should improve assessment procedures and address issues. New science teachers also need guidance to negotiate assessment's difficulties, especially maintaining outcomes validity and dependability. According to the report, contextualizing learning materials training programs should be prioritized. Teacher-student-parent communication must improve to handle absence, external issues affecting learning, and negative feedback. Science teachers should also receive assistance and resources to create and link assessment objectives with learning outcomes.

Finally, further study is needed to understand science instructors' problems across educational contexts. These findings can inform legislative reforms to support teachers' assessment approaches, improving scientific education.

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