

Students' Performance in Online and Face-To-Face Standards-Based (SBA) Assessment in Science: Basis for Intervention

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ABSTRACT

This study sought to explore and compare the performance of a diverse group of students, aged from 12 to 19, in Standards-Based Assessments (SBA) under online and face-to-face learning environments. The demographic profile included a slight predominance of female participants, with a multicultural mix of Filipino, foreign, and half-Filipino students. The pretest results showed that most students in both learning modalities were categorized as "Progressing towards standards," although the online group had more students who earned a higher rank of "Highly proficient." In the posttest, both groups achieved similar average scores, with the online group showing more variation in performance compared to the face-to-face group. Despite these differences, statistical results found no significant performance gap between the two groups. Demographic factors such as age, sex, and nationality did not significantly influence SBA scores. The GPA or the grade point average, on the other hand, strongly correlated with SBA success, highlighting its predictive value. On the other hand, the result showed inconsistency with the respondents' high GPA in science with "Progressing towards standards" scores in both pretest and posttest in SBA. These findings suggested that both instructional modalities are equally effective, and targeted, blended interventions are necessary to improve student performance and bridge learning gaps in diverse educational settings. Finally, some recommendations were gleaned from the findings of the study. Student and teacher welfare may be given more care and attention in order to maximize both their successes, and that there were still other potential predictors that needs to be further explored which could also better explain some of the variations in the results.

Keywords: Student Performance, online and face-to-face learning, science assessment, standard-based assessment (SBA), intervention, demographic profile, age, sex, nationality, grade point average (GPA)

INTRODUCTION

Education has always been the foundation of knowledge acquisition and experiential learning for students. It allowed individuals to gain confidence and achieve better opportunities in life. Technological developments played a significant role in this intellectual endeavor. This is demonstrated by how schools depend on various technologies for teaching, such as blackboards, radios, televisions, and, more recently, computers, portable communication devices, software development, and the internet (Halder & Saha, 2023). It was technology that had gifted humanity with the possibility of choosing modes of learning: either through the more traditional, face-to-face means of learning, or its more novel, remote, and online counterpart.

The contrast between the performance of students enrolled in either a pure online or face-to-face mode of learning has often been highlighted in the past decade. Although some research attempted to shed light and determine which modality was the most effective, the findings remained largely unclear. The consequences and immediate effects on students' academic performance remained inconclusive (Baum & McPherson, 2019). This is critical, as any confusion about the learning methodologies being used would be detrimental to both learner success and the efficiency of the learning process.

Understanding students' academic performance in each modality served as a prime example of this challenge. As shown by some research, there is no discernible performance distinction between online and face-to-face

interactions (Hafeez, Ajmal, & Zulfikar, 2022; Omole et al., 2023). Some scholars, such as Fenteng (2023), even held a negative outlook on online learning. She believed that the quality of online education were diminished by several factors that were avoidable in face-to-face education. We also had other researchers who argued that online education produced more favorable test scores than its face-to-face counterpart, as shown in the study by Geng & McGinley (2021) or by Stevens et al. (2021).

Additionally, while several studies analyzed and compared the overall permanence of students in the Philippines, there remained a need to examine student performance based solely on examination results. This would help identify differences between the two learning methods and pinpoint the specific areas where students may be struggling. By understanding these challenges, potential solutions can be created and adjustments implemented to improve the science assessment results of our students in the country.

There was also a question of which specific educational technology to adopt. The process of adaptation frequently fell short of addressing the individualized hurdles faced by each student, as reported by the Global Education Monitoring 2020 in UNESCO (2023), highlighting a critical gap in the current educational paradigm. This discrepancy underscored the importance of educational institutions, not only adapting to new ideas, but also providing customized solutions that cater to every learner's distinct needs and challenges. These would foster progress, usher in a brighter more prosperous future, not remain mired in confusion and friction.

The questions this study aimed to shed light to is timely and focal in today's society. The struggle to balance the development of technology with the dynamism and ubiquitous nature of education. According to the Organization for Economic Co-operation and Development and the World Bank (2022), approximately 1.5 million students worldwide had to find alternative means to continue their education during the pandemic. The majority of those students had to continue their education mainly through remote learning means. It became economically urgent to bring back face-to-face classes towards the tail end of the pandemic (Cohen et al., 2022). Between 2020 and 2023, the worldwide number of students enrolled in pure online classes decreased by as much as 50% (Bouchrika, 2025). On a surface level, if this trend continues, it might seem that there would be no need for an alternative mode of learning, especially in a post-pandemic world. This would then undermine the significance of the researcher's undertaking. Is it still worth knowing which modality is the strongest? What will be gained from learning that is more effective? Is there still any relevance and value for these kinds of continuing studies outside of the COVID-19 pandemic?

The answer would be a resounding yes. The post-pandemic conditions hardly hampered the adoption of distance and hybrid learning modalities. There were still students who actively sought and looked for such modalities. According to a 2024 Forbes report, at least one in every four students was still likely to choose to learn fully remotely. It also predicted that the e-learning market will continue to grow at a rate of 20.5% from 2022 to 2030. Furthermore, CNN (2021) reports that some parents opted to leave or actively seek out pure online classes, with some claiming that their children experienced better academic success than when attending onsite classes. What all these reports point out is that online learning was not just simply a specter of the pandemic that passed by, nor was it only pragmatic during worldwide crises. There was still a markedly significant number of students who desired such a mode of learning.

Another factor to consider is how the pandemic expedited the adoption of new learning technologies. This is not to disregard the negative impacts brought by the former. However, many educational and academic institutions benefited from the situation, as they were compelled to update, modernize their technologies, and develop new pedagogical methods. Additionally, these technologies acquired during the pandemic are still being utilized, particularly in extreme weather conditions such as the onslaught of storms or extreme heat (Department of Education, 2024). Therefore, it became of paramount importance to be well-informed about the efficacy of remote learning.

Lastly, this study aimed to investigate the relationship between students' performance in online and face-to-face Standard-Based Assessment (SBA) in science, and ultimately, provide a basis for intervention. It focused on uncovering any disparities between the two modes of classes, face-to-face and online. This was in view of contributing to the ongoing discussions on the accuracy and effectiveness of remote learning, which, thus far, have been inconclusive. It aimed to provide educators with the necessary information to make informed deci-

sions about the learning process. Furthermore, it sought to suggest solutions aimed at mitigating and eventually eliminating assessment gaps, thereby enhancing students' performance in science assessments.

Statement of the Problem

This study aimed to identify the relationship between students' performances in online and face-to-face Standard-Based Assessment (SBA) in science, providing a basis for intervention during the 2023-2024 school year.

Specifically, it sought to answer the following questions:

1. What is the profile of the respondents in terms of:
 - a. age;
 - b. sex;
 - c. nationality; and
 - d. GPA in science?
2. What is the Standard-Based Assessment (SBA) pretest performance of students exposed to online and face-to-face learning?
3. What is the Standard-Based Assessment (SBA) posttest performance of students exposed to online and face-to-face learning?
4. Is there a significant difference between the pretest and posttest performance of the students when exposed to two different modes of learning?
5. Is there a significant relationship between the profile of the respondents and their performance?
6. What intervention can be proposed to mitigate any disparities between the two classroom modalities?

Research Hypotheses

The following research hypotheses were tested in its null form at 0.05 level of significance:

Ho 1: There is no significant difference in the pretest and posttest performance of the students when exposed to two different modes of learning.

Ho 2: There is no significant relationship between the profile of the respondents and their performance.

Significance of the Study

This study investigated whether online and face-to-face science standards-based assessments yielded different performance levels among students. It could enhance approaches, improve the effectiveness of virtual and/or face-to-face assessments, and eliminate weaknesses by investigating the root causes of performance disparities.

This study was specifically significant for the following:

Curriculum Developers. This study would help identify the most effective resources and strategies tailored to the strengths and limitations of each learning modality. It would ensure that learning outcomes minimize the differences across both face-to-face and online settings, allowing for a fair instructional delivery.

High School Students. This study would allow the students to choose their preferred mode of learning based from the findings of the research. It would enable students to handle their learning experience in a more effective manner.

Parents and Guardians. As one of the stakeholders of the institutions and main advocates of their child's welfare, this study would have parents and guardians check on the best mode of education to cater to the needs of their children in terms of science academic performance.

School Administrators. Recognizing the differences in academic performance between students enrolled online and those enrolled face-to-face, this study would help strengthen reinforce the current strengths, and eliminate the weaknesses of the assessment. It would help promote effective school rules and practices, alongside enhancements for future planning of school programs and curriculum designs that were informed by the study's proposed interventions.

Science Education Teachers. The findings of this study could inform the development of a science curriculum that caters to both traditional and online learning modes in high school science. Furthermore, this study may support the quality of science teaching and learning process, and assist educational administrators in the development, implementation, and evaluation of both online and face-to-face learning.

Future Researchers. This study may provide a strong basis for the upcoming studies in the field, presenting relevant information and opportunities for more investigation.

Scope and Delimitation of the Study

This study compared the face-to-face and online performance in the science Standard-Based Assessments (SBA) of high school students. The participants of the study were 7th to 10th-grade High School students who were enrolled in either full face-to-face or full online modes of learning at South Global Educational Network (SGEN) Schools, namely: Southville International School and Colleges (SISC), South Mansfield College (SMC), Stonyhurst Southville International School Malarayat (SSISM), and Stonyhurst Southville International School Batangas (SSISB) in the school year 2023-2024.

The study was limited only to these schools because they were the ones offering both full online and full face-to-face learning modalities. The data will be sourced primarily from the students' demographic profile, science grades, and their science SBA pretest and posttest results.

Definition of Terms

To enrich understanding of this study, the following terms are defined both conceptually and operationally:

Assessment. The Glossary of Educational Reform (2015) defined assessment as the broad spectrum of methods or instruments that teachers used to gauge, measure, and record academic preparedness, progress in learning, skill development, or the needs of the students. In this study, assessment referred to the objective type of test administered to online and face-to-face 7th to 10th grade students.

Face-to-face mode of learning. The face-to-face mode of learning was a pedagogical approach designed to enhance the learning experience through interactions with others (Julien & Dookwah, 2020, citing Qureshi, 2019, and Miles et al., 2018). Classes are held daily, typically with classroom chairs arranged and a board positioned in front to accommodate both students and teachers (Julien & Dookwah, 2020). In this study, the term 'class mode' refers to the mode of instruction where teachers deliver lessons to students who are physically present at school in the same physical space and at the same time frame. The terms face-to-face and onsite are used interchangeably.

Face-to-Face Student. Face-to-face students refer to the students enrolled in face-to-face learning. They are required to attend school in person to participate in classes and take paper-and-pencil assessments on-site.

High School Students. These are the Grades 7-10 students of Southville International School and Colleges (SISC), South Mansfield College (SMC) Colleges, Stonyhurst Southville International School- Malarayat (SSISM), and Stonyhurst Southville International School- Batangas (SSISB).

Intervention. Hawthorne (2023) of highspeedtraining.com.uk defined intervention as a targeted, brief school program tailored for individual or small groups of students with particular educational needs. In this research, the assistance that the school will provide to students who need extra guidance to improve performance in science is referred to.

Online Learning/Online mode of learning. Basar et al. (2021, p. 121) define online learning, also known as e-learning, as any form of pedagogy facilitated by digital technology. In this study, this refers to the mode of class where classes are held virtually via Google Meet. Throughout this study, the terms "online learning" and "virtual learning" were consistently used interchangeably as synonyms.

Online Students. This refers to the students enrolled in full online learning. They are required to attend classes virtually and complete all the assessments via online.

Posttest. This refers to the assessment that measures the growth and improvement in students' knowledge over the course period and determines whether they have acquired the necessary knowledge to pass the course (Hornbuckle, 2022). In this study, this term refers to the test that students take after completing all the topics in the curriculum.

Pretest. Hornbuckle (2022) defined it as a non-graded assessment where teachers will be given an opportunity to gauge their students' understanding and skills in a subject. In this study, this term refers to the test that students take at the beginning of the school year.

Standard-Based Assessment (SBA). This is a battery test with recognized standardized questions for each level from Preparatory and First to Tenth Grade, aligning national and international standards. This assessment covers the three core subjects explicitly: English, Mathematics, and Science (APSA, n.d.). In this study, the science assessment is administered to both online and face-to-face high school students.

Student Performance. This indicates the students' ability to complete tasks. This is measured by objective standards, such as grade point average and final course grades (Matalka & Dwakat, 2022). This study focuses on measuring students' learning based on the results of their assessments.

RELATED LITERATURE

Student Demographic Profile

In a study by Navarro, Garcia, and Olivares (2025), the researchers investigated the academic impacts of students' relative age (i.e., their grouping based on birth dates) and socioeconomic status. They were able to confirm that older students relative to their grade levels performed better academically than their younger classmates. The effect was more pronounced in lower-grade levels, and gradually decreased in more advanced levels. This effect is also otherwise known as the "relative age effect" (RAE). The study emphasized the need for implementing more flexible policies, as well as a refined early and comprehensive evaluation system, such as neuro-developmental assessments, to support students and their parents better.

According to Merritt (2021), the cumulative grade point average (GPA) serves as a benchmark of students' overall academic performance. This was supported by her study, which indicated that GPA is a reliable indicator of students' academic strength. The study focused on the history, grading standards, significance, and use of the grade point average, examining its role in determining college eligibility, predicting academic success, and assessing its advantages and disadvantages. The author also emphasized that a student's GPA can predict their future performance, not just a mere summary of their achievements.

The Global Education Monitoring Report for International Day of the Girl accumulated data that showed significant progress in girls' education since 2015. Around 50 million more girls have been enrolled in schools, including a 22.5 million increase in primary-level student enrollment, 13 million in upper secondary education, and 14.6 million in lower secondary education. Subsequently, around 5 million more female students were completing all of the required levels of their education. Furthermore, they affirmed the reports that female stu-

dents are increasingly outperforming their male counterparts, especially in reading and mathematics. However, some reports have pointed out difficulties in establishing gender parity among students in less developed countries. According to UNESCO (2024), 122 million girls are still unable to enroll in schools, with sub-Saharan Africa accounting for over half of these students. In Afghanistan, girls continually face mass exclusion from education, with significantly higher numbers of unenrolled female students compared to those of males.

In contrast, in a study by Paul & Jefferson (2019), they compared student performance in environmental Science from 2009 to 2016, examining online versus face-to-face variants. They studied these two learning approaches to determine which teaching method demonstrated greater effectiveness over 8 years. They found that there is no significant difference in the learners' performance, especially in terms of their gender and class rank. Furthermore, the researchers found a possibility of increasing the involvement of non-STEM majors in citizen science by utilizing the convenience of online learning to teach fundamental environmental science concepts.

Ethnicity also played a significant part in how students perform academically. This finding was supported by a study conducted by Kirti et al. (2008), which investigated the differences in academic achievement between Filipino American and Chinese students. The results showed a strong correlation between academic success and ethnicity, with variables such as acculturation and family participation playing key roles and significantly affecting the students' academic success.

Lastly, in a study by Banda et al. (2023) on the impact of geographical home location and ethnic identity on student academic performance found that one's place of origin is not a predictor of academic achievement among students. Additionally, based on the Kruskal-Wallis test ($N = 20,263$), it was evident that no region performed significantly better than the others. Additionally, a thematic analysis of interview data ($N = 15$) using NVivo revealed that it is not one's regional origin that impacts academic performance, but rather the effort of the students.

GPA in Science

According to Gregorio (2025), strengthening science education in rural Philippine areas is crucial for developing both an educated future generation and community. The challenges that hinder these include a lack of resources, poor infrastructure, and an insufficient number of well-trained science teachers. The author also pointed out that the effectiveness of resolving these challenges relies on the collaboration of the government, our educational institutions, local organizations, and the communities. A key strategy is to devote and invest in improving infrastructure, training more teachers, integrating the latest technologies, improving resource management, and fostering partnerships.

Face-to-Face and Online Student Academic Performance

A comprehensive review by Meng et al. (2025) examined 25 articles to assess the effectiveness of online learning in higher education during the COVID-19 pandemic. The results showed that the articles collectively failed to reach a consensus regarding the effectiveness of online learning. The findings had mixed conclusions, some of which were based on the assessment methods employed (e.g., longitudinal studies, self-reported effectiveness, randomized controlled trials). The review also identified various factors that influenced the success rate of online learning. These included flexibility, negative emotions, the absence of social interaction, infrastructure, instructional quality, and convenience. However, though the effectiveness of the online mode of learning is still up for debate, the authors also highlighted how many people generally experienced difficulties during the pandemic. The lack of infrastructure in developing nations exacerbated the problems for hosting and participating in online classes.

Parilla (2024), however, found upon her investigation that the face-to-face mode of learning consistently outperformed online programs across the Community of Inquiry (CoI) framework elements. In terms of cognitive presence, face-to-face settings fostered better critical thinking and problem-solving skills. This was attributed to the immediacy of the interaction that happened between the students and their instructors. In line with this,

social presence became a core part of the learning experience as it allowed for a more robust sense of community.

Parilla's findings are put into action by Focus Group Discussions (FGD). This was an activity that students could participate in. It was a valuable factor that facilitated more real-time conversations, quick feedback, and an enhanced sense of camaraderie and connection within the physical classrooms. While acknowledging the convenience of online learning, the study participants cannot help but note some of its drawbacks, including, but not limited to, technological and social constraints. In summary, both the Col Framework analysis and student feedback from FGDs indicate a clear preference for and more positive outcomes in traditional face-to-face learning.

The study by Mwembe and Chari (2023) on educational disruptions in relation to online learning effectiveness addressed the impacts of the COVID-19 pandemic on Zimbabwean schools. The latter necessitated a shift towards an online mode of learning. This greatly disadvantaged the under-resourced schools. The study aimed to evaluate how this shift influenced the academic performance of students by comparing pre-pandemic and pandemic-era results in the arts, commerce, and Science. The study's results revealed that the transition did not significantly alter passing rates for arts and commercial subjects. However, it did statistically and negatively affect their outcome in science. Interestingly, the study also highlighted a disproportionate negative impact on female students. As a solution, the study advocated for transitioning their mode of learning once again to a hybrid setup as a compromise between the health dangers posed by the pandemic and the steep decline in student performance in science.

This study, conducted by Scrimgeour & Huang (2022), aimed to confirm the comparability of results from the two main modes of assessment on student achievement: computerized and pen-and-paper. This was also known as test mode comparability, a metric that quantifies differences between modes of assessment in terms of students' test results. As stated by the study, it should be in the school's best interests to routinely compare the results of different assessment modes to draw valid conclusions that will significantly influence school decisions. Past studies on test mode comparability, for the most part, concluded that the differences between the modes were insignificant. This study attempted to confirm this by examining the "End-of-Grade " and End-of-Grade" examinations in the subject areas of high school biology and eighth-grade English Language Arts and Mathematics. The students were assigned, in a non-random manner, to either a computerized or pen-and-paper-based assessment. T-tests and generalized linear models were used to examine the effects. The results showed that the effects were insignificant. However, the authors affirmed that computer-based assessment consistently demonstrated decreases in performance. Hence, they maintained that the results were noteworthy, and that school authorities must take into consideration the factors that contribute to the difficulties associated with the aforementioned test mode.

Cano (2022), from Notre Dame of Marbel University, Philippines, compared his study of the academic performance of senior high school in face-to-face and online settings. The study revealed a significant increase in academic success within the online distance learning context compared to traditional face-to-face learning. Cano attributed this favorable result to various factors inherent in online learning modalities, such as improved access to resources, increased engagement, and greater learning autonomy. This research was relevant to the current study, as it supported its goal of determining how student performance differs between face-to-face and virtual learning modalities.

Escomes et al. (2021) investigated the variables that affected distance learning among students at Sultan Kudarat State University in the Philippines. The study revealed that students were less motivated to participate in online class discussions, demonstrations, and the completion of assessments and assignments. Thirty-three second-year Physical Education students were the primary respondents. Data were gathered through survey questionnaires via Google Form and descriptive methods. Furthermore, the study prescribed that the Commission on Higher Education should impose a cap on the number of students in each class to foster limited face-to-face classes.

In the empirical study conducted by Geng & McGinley (2021), they analyzed both qualitatively and quantitatively the two major assessments (research project and midterm exams) in the science course's learning out-

comes. This was to compare the face-to-face and online modes of delivery. Both delivery methods yielded similar results on medium-order analytical skills, as indicated by midterm tests. The same study revealed that online students statistically outperformed face-to-face students in the development of high-order analytical skills, such as those required for research projects. This suggested that online education was equal to, if not more effective than, face-to-face education in achieving the learning outcomes of the students.

In an investigation conducted by Stevens et al. (2021), the comparative superiority of student academic outcomes in virtual and face-to-face in the university teaching programs from 2000-2020 was analyzed. The research found that online learning yielded higher and better learning performance, with a percentage of 41%, while face-to-face learning was reported to have a percentage of 18%. Remarkably, the remaining 41% showed no significant difference between the two modalities. This suggested and compare that online learning is as effective, if not more productive than, the face-to-face modality.

Moreover, the study related the better learning performance of students to the learning content designed to enhance student-led inquiry and cognitive challenges. On the other hand, the study was limited in terms of the differences in the research data gathered and compared, as those studies are composed of different key variables in their ideas and outcomes.

In 2021, Chisadza et al. gathered evidence to identify factors that may have influenced students' performance during the transition from traditional full-face-to-face to full online learning. By administering survey questionnaires to students from the South African University, and by comparing the average grades from pre- and post-pandemic, the study revealed several key findings. One of the identified significant factors was the speed of internet connectivity, which played a crucial role in enhancing student performance. A similar trend was observed regarding the students' family status. Furthermore, it emphasized that, based on the students' performance before and after the pandemic, they preferred lectures, both live and pre-recorded, over self-study activities such as reading slides and notes. These findings underscore the importance of internet connectivity in enhancing students' performance, suggesting that improving connectivity and supporting less fortunate students with internet access can lead to better academic outcomes.

The study by Arias, Swinton, and Anderson (2018) aimed to measure the efficacy of face-to-face classes in contrast with their online counterparts. It highlighted the need to overcome several factors that negatively impact the effectiveness of comparing online and face-to-face classes. Several factors must be considered to ensure the integrity of a comparative study. Firstly, there is a difficulty in clearly defining the scope and extent of class settings we can consider online. The second is the issue of student and teacher biases. This occurs when students typically self-select and enroll in a class mode where they would feel most competent. In other words, a form of selection bias. This effectively hinders the use of a random selection method in collating the student population. In studies where only a single instructor teaches in the two differing modes of learning, personal preferences can impact how the instructor behaves in terms of effort, efficiency, and proficiency.

To mitigate these issues, the study implemented randomized enrollment procedures with the approval of the involved administrators. As stated, students can enroll in the course titled "Principles of Macroeconomics. They are also informed about the conditions of the course: enrollees will be assigned randomly between the two sections, one of which will be entirely online. A single instructor was assigned to teach both sections, although they were also instructed to design a course that is optimal for the online section. There were two means of measuring student performance. The first was measuring the improvement in results between a pre-test and a post-test that the students answered. The second was measuring the students' exam averages over the entire course. The results showed that students assigned to the face-to-face section demonstrated significant improvement in their post-test results compared to those in the online section. However, the study was also cautious of its results due to having a small sample size of participants.

Standard-Based Assessment (SBA)

The report, posted by Barcroft Elementary School (2022) from Arlington, Virginia, defines SBA as a method for assessing students' mastery of various skills. This method promotes a non-intimidating and non-discrimina-

tory assessment of students' level in the subject. In a typical grading system, the students are rated either A, B, C, D, or E based on their academic performance. An A signifies that the student has mastered the lesson, achieving a high rank. Conversely, receiving an E indicates the lowest level of attainment and failure in meeting the subject's minimum demands. Barcroft Elementary School observed that this grading scheme tends to create a judgmental environment that is counterproductive to effective learning. Alternatively, SBA uses "Approaching towards standard", which dictates that students should neither be considered as a zero nor failing since. This, effectively, creates a more positive outlook in the students' learning by promoting the idea that the development of their competencies and knowledge content are never stagnant. Students who have attained the skills required would have "Met Standard" indicated in their reports.

Schools are the core foundation of any country. However, despite the continuous progress of the educational system, the consensus on the most suitable assessment remains a topic of ongoing discussion. Globally, assessments play a crucial role in enhancing the overall quality of education, as well as the quality of education at the individual level. Sharma's (2015) study presents an invaluable opportunity to enhance teaching methods, exploring a feasible approach to improving the quality of student learning and elevating their achievement levels. He concluded that allowing the use of standards-based assessment content in the classroom would greatly help enhance learning.

Asian Psychological Services and Assessment, Inc. (APSA) is the only certified testing company of the International Organization for Standardization (ISO). It creates SBA battery tests with multiple-choice standardized questions that encompass English, Science, and Math for each level, from Preparatory and First to Senior High School Grade, aligning with national and international standards (APSA, n.d.). These standards (Ay-ad & Lomaad, 2016) are aligned with the DepEd Barcroft K-12 curriculum and international standards.

Since the new, user-friendly SBA platform was launched in May 2020, more than a thousand online tests have been conducted nationwide. PHINMA Education Analytics, Chief Dr. Nigel N. Cabison, stated on the PHINMA Education website that "through the data learning outcomes, we are unable to identify areas of strength, as well as for improvement, to address the learning gaps of students" (May, 2023). The current Southville International School and Colleges K-12 and IB Principal, Dr. Marie Vic Suarez, emphasized in her interview that the results of the assessments are highly valuable as they serve as "a benchmark for refining classroom strategies and designing curriculum enhancements."

In a study conducted by Alpuerto & Sales (2016) on the correlation between mathematics grades of 7th, 8th, 9th, and 10th grades and the Asian Psychological Services and Assessment, the results revealed that the 7th, 8th, and 10th grades are statistically significant, while the 9th grade is not. The researchers concluded that students with low final grades are more likely to attain low APSA performance, and that the Math subject garnered the lowest averages, therefore significantly and negatively influencing the overall results.

APSA, the pioneer in standards-based assessment, began offering it from preschool to senior high school students. This is in accordance with the Enhanced Basic Education Act of 2013, which aims to develop lifelong learning, enhance skills, and foster responsible citizenship. The SBA is based on the DepEd's international curriculum standard for each level, from preschool to senior high school. It measures how much students have advanced academically in the core subjects, namely English, Science, and Math. In Science, for example, there are 100 test questions. Scores below 69 will have a qualitative description of "Not met standards," 70-79 is "Progressing towards standards," between 80-89 is "Proficient," and "Highly proficient" if the score is 90 and above. The SBA substantially benefits students, teachers, parents, and other school stakeholders by providing feedback on students' learning, progress, and advancement. It reveals gaps in the students' learning skills, allowing for focused improvement. Moreover, it also measures performance in comparison to norms and provides objective feedback on the quality and effectiveness of instruction (APSA, n.d.).

Pre Test and Post Test Assessments

A study conducted by Janelli (2019) examined the effects of pretests and feedback on performance outcomes through the administration of a posttest, involving 606 student participants. The study revealed that among those who took the pretest and completed the subject, higher outcomes were achieved in the posttest than

among those who did not. This finding, according to the author, represents a significant contribution to the literature on assessment and feedback.

Intervention

In a study conducted by Bayat, Kohli, and Madyibi (2024), they confirmed that poor school management and resource allocation contributed to the number of students who were unable to perform academically. Furthermore, the authors also highlighted the Promotion and Progression Policy, which acts as the basis in determining whether a student can advance to the next grade level. On many occasions, despite the policy being in place, students were allowed to proceed to the next level even if they were unable to display sufficient mastery of the subject or key competencies. This study investigates the factors that contribute to the decline in academic performance, grade-level repetition, and school dropout rates in disadvantaged schools. The study primarily focused to schools within South Africa's Amathole West District, and viewed the situation through the lens of the 2013 promotion and progression policy.

Bayat et al. (2024) also found that requiring students to repeat a grade level when the past year's competencies were not met was counterproductive. A typical school year that followed a difficult curriculum would see many of its students undergoing learning deficits and socioeconomic pressures like substance abuse, unwanted pregnancy, or the pressure to contribute to their household. The policy of having them repeat the grade level upon missing the required competencies by a short margin only contributed to the increase in student disengagement and the number of dropouts, especially in Grade 10. This affects both genders, but most especially males.

In empirical research conducted by Deslauriers, Harris, and Weiman (2022), an intervention was implemented for students who failed to get a high score on their midterm exam in two introductory courses: physical and oceanography. Students who failed the oceanography exam, despite spending more than the class median of six hours, also failed the test. In contrast, students who ranked in the bottom 25% received an email from their instructor. It conveyed concern about their poor performance and was accompanied by an invitation for a special 15–20-minute session, either in a group or individual setting. Although all the target learners received the email, not all of them attended the meeting with the instructor. The primary objective of the intervention was to encourage students to engage in deeper learning by self-testing and understanding the course goals. The instructors supported the students using this approach by providing them with questions to practice during the session and problem sets to answer at home. The results showed that students who received the email and had met the professor scored significantly higher on the exam compared to those who received an email but had not met the professor.

Related Studies

International

Aprianti et al. (2022) administered a case study on the impact of gadgets on learning outcomes. They use Indonesian Junior high school students as their primary respondents. In the study's outcome, the researchers highlighted that students use their gadgets for gaming, social networking, and communication, in addition to their school work. It also showed that students who used their gadgets more frequently encountered more conflicts in their social and academic lives compared to those who used them less. The study also noted how students can benefit from gadgets in several ways, including easier access to knowledge, increased creativity, and support for collaboration and long-distance learning. Nevertheless, it underscored that excessive use of gadgets can impair cognitive development, academic achievement and the students' motivation to learn. It can also lead to poor time management and health problems like insomnia.

This study (Chen, 2020) aimed to assess students' ability for Self-Regulated Online Learning (SRL), which involves providing systematic effort in managing their own learning process to achieve their goals, all within an online learning mode. Amidst four classes of undergraduate students undergoing a Small Private Online Course (SPOC) on College English II, 245 students in total were chosen to answer an adapted questionnaire from the Self-regulated Online Learning Questionnaire-Revised (SOL-Q-R). The questionnaire aimed to

measure seven scales that comprise the core of SRL: metacognitive activities before, during, and after learning, persistence, environmental structuring, time management, and seeking help.

The research results indicated that the randomly chosen learners had SRL total scores higher than the intermediate level. It also had an environmental structuring scale showing upper intermediate levels, and the metacognitive activity before learning scales, including persistence, time management, and help seeking, are not considerably higher than the intermediate level. In particular, the results demonstrated that the SPOC setting allowed more students to feel very comfortable in the study setting and location for the online course, and were able to avoid distractions. Higher metacognitive activities during learning are evidenced by an above-average number of students who were critical of their academic performance during an ongoing online course. However, metacognitive activities drop when the online course is not ongoing. Additionally, students found it more challenging to seek help from peers when limited to a purely remote class setting. To conclude, while the students' ability to manage their own learning is above the intermediate level, there is still room for improvement, especially in terms of the enduring impact of the online courses outside of classes, both during the initial phase and the persistence phase.

In the article written by Ng, Cheng, and others (2020), they sought to investigate the effects of using an "online collaborative annotation" approach on the reading skills of two classes of newly graduated high school students enrolled in the Higher Diploma in Early Childhood Education Programme. The annotation act involves putting in marks, highlights, or notes on specific parts of a reading material. It is an effective way of highlighting specific points within the material, facilitating better retention of the ideas and concepts presented.

Furthermore, annotations traditionally benefit only the individual annotator themselves, since the imprints left on the material are highly personalized. With the advent of digital annotation, it has become easier, less resource-intensive, and far more accessible to incorporate one's annotations into digital materials in a non-destructive manner. The authors then strove to see the possibilities of incorporating collaborative annotation using social annotation tools within a class, as well as peer assessment. They divided the classes into several groups. Each group was given 30 pages of reading material in paper format and asked to come up with 10 questions, then mark the answers on the material. Afterwards, the questions and annotations made by the different groups were collected. The questions and their respective annotations were then distributed anonymously and randomly to other groups via the online collaboration platform. They were also asked to assess the quality and accuracy of the questions and their annotated answers. The students were subsequently directed to complete a set of questionnaires to gather their insights about the activity. The results show that 84% of the students had never encountered such an online collaborative activity before. The questionnaire consisted of a 10-point scale, with 1 indicating 'strongly disagree' and 10 indicating 'strongly agree'. A one-sample t-test was used to assess the students' answers, with a mid-value of 5.5 on the scale. The resulting means from the students' answers yielded a range from 7.44 to 7.81, indicating a significant positive stance as well as deviation from the neutral point. This suggests that peer-assessed, online, and collaborative annotation processes were favorable to the students and had a positive impact on them. It also highlights how such an activity engaged the students to actively participate in what should otherwise be an objectively undesirable 30 page reading session. Students were found to be thinking more critically, conducting analysis on the material, and are actively interested in the collaborative elements of the activity. It is also worth noting that the majority of students expressed a desire to participate in a similar activity again in the future.

Soffer & Nachmias (2018) undertook a comprehensive study comparing the effectiveness of three different courses in face-to-face and online education. In this study, variables such as completion and grades, which fall under objective measures, as well as engagement, satisfaction, and aspects of the instructions, were used to test the effectiveness. The results, across most of the variables tested, revealed a significant difference between face-to-face and online courses. Students in face-to-face courses made more effective learning content contributions. In contrast, students in the online course achieved better results in terms of engagement, satisfaction, communication, and comprehension of the course structure.

In total, the study highlighted that online courses are as effective as, if not even more effective than, their face-to-face counterparts. This suggests that virtual learning can be a viable alternative to traditional face-to-face

settings. Additionally, it emphasized the importance of considering the characteristics and content in the development of the online course.

During the war between Yemeni rebel groups, the Arab Coalition, and Saudi Arabia, the latter suspended face-to-face classes, and switched to virtual learning to ensure that the learning of the students was not disrupted. Rajab (2018) initiated research at Najran University, comparing student performance between online and in-person learning. Surprisingly, the study's results did not show a significant difference between the two learning modalities in terms of student performance. The research suggested that, during times of catastrophe, virtual learning can serve as a reliable alternative for continuous learning, and eventually safeguard the educational system. This led to a recommendation that the Saudi Arabian government invest in virtual learning and teaching, so that education can still be possible in times of crisis.

The same was modeled after earlier research by Kuo & Wu (2013), who cited Bennett and Bejar (1998), according to which Computer-Based Assessments (CBAs) are seen as interrelated systems consisting of integrated elements, such as the examinee's interface, scoring process, and reporting procedure. With this in mind, the researchers mulled over the predominantly inefficient use of CBAs, which, for the most part, employed multiple-choice-type assessments. In this study, then, they sought to further explore the possibilities of CBAs by collecting and analyzing data from other published journals regarding other types of assessments, specifically those implemented in basic Science and medicine.

Researchers found that only 19 used the engaging and dynamic platform for presenting items after analyzing 66 Computer-Based Science Assessments (CBSAs). The study also maintains the interrelationship of the different components of CBAs. Failure to utilize even some of the components would be detrimental to the overall potential and effectiveness of the assessment mode. The study suggests that designers of assessment modes provide more attention to their creation by carefully considering the interrelatedness of the different components of CBSAs. This is significant to this research because it is closely related to its focus of investigation. It provides details about the academic performance of students enrolled in face-to-face versus online classes.

Local

Previous studies in the Philippines have extensively explored students' intentions to pursue online learning at the end of the pandemic. According to Illescas, Ong, & German (2023), attitudes towards behavior and affective behavior statistically have the highest direct effect on students' preferences, including their decision on whether to pursue online or face-to-face learning. This demonstrated that they find online modality comfortable and less intimidating. Similarly, confirmation of expectations also has a positive effect on the student's choice between the two modalities. The research revealed that students regarded online learning as an avenue that offered a wider and more diverse means to enhance knowledge and skills through 24/7 access to learning resources. On the other hand, it also stated that there are no significant and direct effects between satisfaction and expectations. The study then concluded that students are not satisfied with online learning despite being aware of the learning similarities between visual and actual learning modalities. This finding is significant to this research because it aligns with the goal of this research which is to provide data that could serve as the basis for deciding whether to continue online or onsite learning modality.

Another study conducted by Gonzales (2023) from the University of Santo Tomas, Philippines, revealed that, during the COVID-19 pandemic, teachers were focused on determining the most effective methodologies to be used in educational circumstances to maintain student learning. There was also high awareness among the teachers regarding the challenges faced by the students. The study observed an increased flexibility among teachers, a considerable use of rubrics in evaluation, and the tendency to ask more reflective questions. Teachers considered those assessments as being tailored to the available resources, as well as to the learners' learning pace and abilities.

On the other hand, Gonzales also found that, despite the teachers making numerous adjustments and considerations in terms of giving and evaluating student assessments, a significant number of the teachers struggled with the environment in which students completed the non-classroom assessments. These concerns included doubts about the validity and credibility of the results, added workloads, and limited options for online assessments.

Moreover, teachers were also alarmed about their lack of training and skills in giving formative assessments in an online environment. Despite acknowledging this deficiency, 72% of them believed that it is remediable, and that they could modify and improve their practices to become more flexible and more virtual-friendly.

As reported by Bautista (2023) through the Philippine Daily Inquirer, the result of the first Philippine Assessment for Learning Loss Solutions (PALLS) disclosed that private school students across grades 1-12 nationwide achieved average test scores of 54.1% in science, and 47.5% in math. Both slipped short of the Department of Education's 60-percent passing grade. Consequently, the study posits that the recent decline in learning is attributed to the COVID-19 pandemic's disruption of traditional learning methods. It also suggested several interventions to solve the problem. These include teacher training, student tutorials, enhancement programs with the support of technology, and the implementation of a regular and detailed assessment of the skills of the students. Barrot, Llenares, & del Rosario (2021) conducted an investigation regarding the challenges faced by students in online learning and how their experiences were affected by the pandemic. The study revealed that the major challenges faced by the students were caused by their learning environments at home. A secondary was related to students' competency and literacy in technology. The study also found that students' challenges were exacerbated by factors such as the learning experience quality, mobility, and social interaction, financial constraints, and mental health issues, all of which were outcomes of the pandemic. Furthermore, the study proposed specific strategies to overcome these challenges, including attention to technological resources and the development of structures, school instructional guidelines and delivery methods, teacher interventions to address difficulties, and collaboration among stakeholders.

Baum & McPherson (2019) conducted a study that aimed to highlight the disadvantages and challenges of conducting online classes compared to their face-to-face counterparts, and how real human interaction plays a significant role in addressing these issues. The article first acknowledges the wealth of advantages that online classes bring to the table: scalability to a wide variety of students, regardless of geographic limitations, adaptability to diverse financial scenarios, help reduce infrastructure costs, and make the completion of degrees and diplomas more accessible. However, the authors also wish to highlight the major disadvantage brought by a pure online mode of learning, which is the quality and outcome of the education. The authors first examined the performance of students, noting noticeable gaps in their GPAs. According to them, several key factors affect student performance. One finding is that students who had previously received excellent academic training, such as high achievers or graduate school students, did not struggle as much when transitioning to a pure online mode of learning. Comparing it with other students who never prioritized or established good academic practices at all, I did not see much improvement in their overall learning quality. The authors linked its cause to the inherent and increased student independence. Under online learning, students are, on most occasions, left to their own devices. If they did not have prior skills in time management or a strong motivation and drive to learn, then these skills are not often developed under online learning. In fact, the authors even went so far as to claim that negative traits possessed by lower-achieving students are further exacerbated by it.

There are a few other drawbacks to the imposition of pure online education setting, such as parents and teachers who habitually prefer enrolling to face-to-face classes, or employers who looks down upon graduates of pure online learning modes, especially those who are under the impression that such modes serve as mere shortcut to diplomas, and does not develop desired skills that are functional and beneficial professionally. The authors then highlighted the idea that genuine human interaction has become a basic cornerstone for quality education. They noticed that student interaction with teachers, as well as fellow classmates, leads to better learning retention and the acquisition of skills that are transferable to professional settings. This thought becomes all the more significant when we consider that most jobs demand collaboration between teammates to finish tasks and projects.

Evidence has also suggested that frequent interaction between students and their peers leads to better student satisfaction, as well as an overall increase in course completion and learning. What the authors then posited from all of this is the idea that the effectiveness of online learning can be boosted when injected with activities that promote human interaction. This becomes all the more relevant when we consider that most forms of online learning often lack meaningful human interaction. The idea is that activities such as virtual office hours allow students to converse with their teachers on a more personal and human level. This can even level the

playing field between academic achievers and academically challenged students, as human interaction facilitates development and promotes self-confidence necessary for success.

Theoretical Framework

The study aimed to delve into the factors that contribute to the students' academic performance and various learning modalities through face-to-face and online examinations. Since students learn in different settings, studies have been divided on which to focus on.

According to Constructivist Learning Theories by Jean Piaget, academic performance can be substantially improved in the educational context by allowing students to explore and discover topics through hands-on, experiential learning. In connection with this approach, Iftikhar et al. (2022) emphasize John Dewey's '*Learning By Doing*' pedagogical philosophy, which supports the idea that learning by engaging in skills greatly contributes to the learning process. These theories suggest that the development of learning through skill engagement enhances academic performance among learners, a phenomenon that is particularly emphasized in face-to-face learning.

On the other hand, Falloon's (2011) study highlights Richard Meyer's *Cognitive Theory of Multimedia Learning* (CTML), which claims that when words and images are utilized together rather than individually, learners comprehend more efficiently. Nowadays, due to the immersive and engaging educational experiences that virtual reality provides, CTML has become more significant as virtual learning has become increasingly common in the field of education. Moreover, scholars such as Davis (1987) have emphasized the value of the *Technology Acceptance Model* (TAM), which posits that students' technology use and performance are influenced by how useful and simple they perceive the technology to be (Lin & Yu, 2023).

METHODOLOGY

Research Design

The study was mainly quantitative in its methods, and on how it arrived at its findings. As such, its emphasis was the analysis of variables and the data that was gathered. It also adopted a comparative research design to examine, analyze, and determine the differences between online and face-to-face modes of learning, spanning from 7th grade, up until the 10th grade science classes. The study compared the gathered data from the students in the two learning modes to see if there were differences in their academic performance and if the mode of learning had an effect on their results.

The respondents were randomly selected from the four networked international schools under the Southville Global Education Network (SGEN). Collectively, these schools had a total of 1054 total high school students, of whom 903 were enrolled in fully face-to-face classes, and 151 were enrolled in online ones. Slovin's formula was used to determine the sample size, arriving at a total number of 291 students selected as respondents. 252 students were enrolled in face-to-face classes, and 39 were in online classes.

Crucial to answering the problem of the research, the pretest and posttest data were also given statistical treatments. In order to create a detailed profile of students, certain variables were taken. Specifically, the frequency, percentage, mean, standard deviation, skewness, and kurtosis were calculated. These were used to compare the students' pretest and posttest performance, and determine if there lie any significant differences. The t-test proved especially useful for this, as well as Pearson Product-Moment Correlation, Point Biserial, and Cramer's V to determine statistical relationships and craft an informed intervention proposal.

The researcher also ensured that ethical and legal standards were upheld all throughout the research process. Permissions were secured from the president of SGEN, and an Ethics Review Certificate from the Institutional Research Office of Southville International Schools and Colleges (SISC). These were disseminated to the different principals of the targeted schools. It informed them sufficiently about the nature and goals of the study, and thus the study gained their full authorization to access their student data.

Presentation, Analysis and Interpretation of Findings

This chapter presented the data collected, a detailed analysis, and an interpretation of the findings in relation to the research questions and objectives.

To put things into context once again, this research analyzed how students perform in online and face-to-face modalities on the Standard-Based Assessment (SBA) in science. The goal of the study was to identify gaps between the two modalities and utilize the findings to develop an educational intervention that promotes student success.

To investigate the first research question, the researcher used frequency and percentage, mean, standard deviation, skewness, and kurtosis to analyze the collected profile of the respondents. This was to help the researcher understand the diversity of the sample and how it represents the general population or target group.

Table 1 shows that there was a total of 291 respondents categorized under several demographic factors, including age, sex, nationality, and their grade point average (GPA) in science for the school year 2023-2024.

The ages ranged from 12 to 19 years old, displaying a diverse age distribution among the respondents across their corresponding grade levels. Among the respondents, 15-year-old students had the highest number, while the 19-year-old students had the lowest. This suggest that most of the students were within their expected academic track or were at their average grade level for their age.

Meanwhile, the smaller 19-year-old students indicate that being over-aged for their grade level are uncommon among the respondents. This data affirmed what Bayat et al. stated in their 2024 research, which found that most students are clustered around the expected age for each educational stage. The data also demonstrated the Relative Age Effect (RAE) as proposed by Navarro et al. (2025).

In terms of sex, there was a slightly higher number of female respondents, with a frequency count of 153, while males are at 138.

As echoed by Fiske's research (2012), the data showed an increase in female participation. On some occasions, it even surpassed the standards initially set by male students in urban and private schools. UNESCO also provided insights into why more female students are becoming increasingly participatory and engaging in school activities nowadays. However, the difference in this case is not that significant. A relatively balanced gender distribution remains in place.

Nationality-wise, 183 students were Filipinos, with a small group of half-Filipinos, numbering at 33 students. A total of 75 students were of foreign origin. From this, we can infer that the large majority of students are Filipinos, followed by foreign and half-Filipino respondents. This kind of distribution is to be expected due to the local population structure of the Philippines. However, the multi-nationality of the population should not be ignored. It not only established the fact that the institution was home to a multicultural student body but also demonstrated the relevance of this study by bridging the differences in cultural and national backgrounds.

The average GPA of the respondents in science was 91.14, with a standard deviation of 4.88. This suggested an overall strong academic performance of students in science. 80 of the respondents, obtained GPA scores of 86-90, or "Above average". There 45 students who scored between 80 and 85, or "average". None of the students were categorized as "Low average" or "Poor". The slight negative skew (-0.348) and low kurtosis (-0.779) indicated that the GPA distribution leaned towards higher scores, with a platykurtic or a flatter peak.

A large concentration of students performed within the "Superior" category. None of the students performed under either "Poor" or "Low average" category. This indicated that there were also a large number of learners who had strong comprehension and proficiency in science. They were able to gain an excellent understanding of scientific ideas and principles.

Table 1. Profile of the Respondents

N=291

Age		f	%				
12		12	4.1				
13		55	18.9				
14		62	21.3				
15		69	23.7				
16		51	17.5				
17		36	12.4				
18		4	1.4				
19		2	0.7				
Sex		f	%				
M		138	47.4				
F		153	52.6				
Nationality		f	%				
Filipino		183	62.9				
Half-Filipino		33	11.3				
Foreign		75	25.8				
GPA	DE	f	%	Mean	SD	Skewness	Kurtosis
96 – 100	Very Superior	62	21.31	91.14	4.88	-0.348	-0.779
91 – 95	Superior	104	35.74				
86 – 90	Above Average	80	27.49				
80 – 85	Average	45	15.46				
75 – 79	Low Average	0	0.00				
70 – 74	Poor	0	0.00				

These results were contrary to those proposed by Gregorio (2025) in his study. His findings suggested that more students fall into the below-average categories, and that student achievements in science are varied.

The second research question focuses on the pretest performance of students in the science Standard-Based Assessment (SBA) in both online and face-to-face learning settings. To answer this problem, the researcher gathered and analyzed the frequency, percentage, mean, standard deviation, skewness, and kurtosis of the students' pretest performance. This facilitated an understanding of the sample's diversity and how it represented the general population or target group. The results are shown in Table 2 below.

The results of the face-to-face students' pretest performance revealed key insights. 181 students scored between 70 and 79. This fell in the "Progressing towards standards" category. It indicated that the students demonstrated partial understanding or mastery of the content and required additional support to achieve full competency. Furthermore, although many students are not fully proficient, they were nevertheless in a position where a well-structured and intentional face-to-face learning environment would greatly benefit them.

The next largest group, comprising 41 students, achieved scores between 50 and 69. This fell under the "Does not meet standards" category, highlighting a group with significant knowledge and skill gaps. This suggested that they would require targeted interventions to bring them up to a desirable, or even excellent, academic level. The next group, comprising 26 students, achieved scores between 80 and 89, thus indicating "Proficient" status.

This showed that a few students had already achieved a baseline level of competency even before instruction, potentially due to prior exposure or familiarity with the material. The same conclusion can be drawn from the fact that 4 students scored in the "Highly proficient" range (90-110).

Table 2. *Standards-Based Assessment Pretest Performance of Students Exposed to Face-to-face and Online Learning*

Score	DE	f	%	Mean	SD	Skewness	Kurtosis
Face-to-face							
90 – 110	Highly Proficient	4	1.59	74.05	5.05	0.815	0.153
80 – 89	Proficient	26	10.32				
70 – 79	Progressing Towards Standards	181	71.83				
50 – 69	Does Not Meet Standards	41	16.27				
Online							
90 – 110	Highly Proficient	3	7.69	75.23	6.96	1.219	1.769
80 – 89	Proficient	3	7.69				
70 – 79	Progressing Towards Standards	26	66.67				
50 – 69	Does Not Meet Standards	7	17.95				

The skewness value of 0.815 indicated a moderate right skew. This suggested that while the majority of students scored around or below the mean, there were higher scores that were slightly pulling the average up. The data also showed a kurtosis of close to normal distribution, with a value of 0.153, which suggested a slight presence of outliers, but nothing particularly extreme.

The highest collection fell in the "Progressing towards standards" category. This suggested that, while many students, who were under the face-to-face mode of learning, had a foundational understanding of the material, most were not yet proficient enough. This is further backed by the fact that the category of "Highly proficient" had the fewest number of students who achieved it. This highlighted the challenge of achieving the highest proficiency possible and the additional support and resources it required from students to attain it.

Supplementary to this point, the research findings of Mwembe and Chari (2023) showed that student performance in science experienced a statistically significant decline. The pretest results for students in the online learning group showed a distinct pattern compared to their face-to-face counterparts. A large number of students in this group also fell in the "Progressing towards standards" category. The 26 respondents, generated a score between 70 and 79. This was similar to the face-to-face group, which also indicated that most online learners had a foundational understanding of the subject and required further instruction to reach proficiency. There were, however, 7 students who fell in the "Does not meet standards" category, incurring scores that only fell in the 50-69 range.

The mean score was 75.23, with a standard deviation of 6.96, indicating higher variability in scores. The skewness value of 1.219 was strongly skewed positively. This meant that more students scored below average, while only a few performed better than average. High performance was rare, but influential since it pulled the average upward. Furthermore, the kurtosis value was 1.769, indicating a leptokurtic distribution. It suggested that it had heavy tails, meaning there were more extreme values than in a normal distribution. Similar to students enrolled in face-to-face mode of learning, the highest percentage of students for the online modality fell under the "Progressing Towards Standards" range. Again, this meant that these students were nearing proficiency but still required further support and development to meet the maximum expected learning outcomes. In a similar vein, the higher ranges incurred the least number of students. The limited number of high-level achievers can be attributed to several factors. As this was a pretest, the students only had a baseline level of knowledge, since the test was administered before instruction. This could also indicated challenges in adjusting to the online learning environment.

The data and findings collected here differed from those found by Mwembe and Chari (2023) in their research. In it, they concluded that the students' performance in science dropped significantly when they switched to online learning. However, although a number of students failed to meet the standards, the majority were still progressing towards fully meeting the expected standards.

The third research question investigated the SBA posttest performance of students who were exposed to both online and face-to-face learning. To answer it, the researcher gathered the frequency, percentage, mean, standard deviation, skewness, and kurtosis to analyze the data. This was to help the researcher understand the diversity of the sample and how it represented the general population or target group. The results were shown in Table 3. The table showed that 130 students in the face-to-face learning group demonstrated a predominantly moderate performance, with the majority falling in the "Progressing towards standards" category. This suggested that over half of the students exposed to traditional, in-person teaching methods performed reasonably well but did not fully meet the highest standards. 83 students achieved scores of "Proficient." This implied that nearly one-third of the students attained a satisfactory level of mastery. A smaller percentage of 23 students scored within the "Highly proficient" range (90–110), indicating high proficiency. Meanwhile, only 16 students scored within the "Does not meet standards" range (50–69). The mean score of 78.86, with a standard deviation of 6.99, suggested a relatively consistent performance, with most students scoring close to the average.

Additionally, the skewness value of 0.715 indicated a moderately positive skewness to the right, which meant that more students scored below the mean than above it, and that there was a noticeable right tail, where a small number of students achieved higher scores. The kurtosis value of 0.197 indicated a moderate concentration of scores around the mean, which suggested that there were no extreme outliers that performed significantly better or worse than the rest. This aligned with the aforementioned observation that most students were clustered around the "Progressing towards standards" and "Proficient" categories. The "Progressing towards standards" range still had the highest frequency of students. However, the smallest number of students fell in the "Does not meet standards" range. This indicated that the majority of students have a basic mastery of the subject matter, but were still unable to achieve the highest proficiency standards. This also indicated the general effectiveness of the face-to-face mode of instruction, as only a relatively small proportion of students failed to meet the learning standard.

This was further supported by the outcome of Parilla's research (2024), which stated that face-to-face settings promote superior cognitive, social, and teaching experiences. This created an optimal environment, coupled with impactful personal instructor feedback, to facilitate better critical thinking among students. Consequently, the online learning group consisted of a majority of students who scored between 70 and 79. They fell under the "Progressing towards standards" level, with a frequency count of 21. This indicated that most online learners were achieving a moderate level of performance. There were 6 students who performed at a "Highly proficient" level. Additionally, 10 students achieved the "Proficient" level, scoring between 80 and 89. In an online environment, only 2 students scored within the 50–69 range. This fell under the "Does not meet standards" level. The mean score for online learners was 79.59, with a standard deviation of 9.12. This indicated greater variation in scores. The skewness value of 0.949 indicated a strong positive skew. This suggested that more students scored below average, while only a few performed better than the others. Outstanding performance was rare but was significant in pulling the average upward. The kurtosis value of 1.91 indicated a flatter and wider peak, or a platykurtic distribution. This meant that there were a few scores concentrated around the mean, and that there were no extremely low or high score values.

The majority of the students again fell under the "Progressing towards standards" range for the online mode of learning. This indicated that the students were continuously developing the necessary skills and knowledge, but had not reached full competency. Similar to the face-to-face modality, the smallest number of students fell under the "Does not meet standards" range. This highlighted the fact that the mode of instruction had a generally positive academic impact on students, as it prevented a significant number of them from incurring failing marks.

Table 3. *Standards-Based Assessment Posttest Performance of Students Exposed to Face-to-face and Online Learning*

Score	DE	f	%	Mean	SD	Skewness	Kurtosis
Face-to-face							
90 – 110	Highly Proficient	23	9.13	78.86	6.99	0.715	0.197
80 – 89	Proficient	83	32.94				
70 – 79	Progressing Towards Standards	130	51.59				
50 – 69	Does Not Meet Standards	16	6.35				
Online							
90 – 110	Highly Proficient	6	15.38	79.59	9.12	0.949	1.91
80 – 89	Proficient	10	25.64				
70 – 79	Progressing Towards Standards	21	53.85				
50 – 69	Does Not Meet Standards	2	5.13				

The results presented here aligned with the findings of Meng and others' review (2025), which also found no concrete evidence of the effectiveness of the online learning modality. The study was supported by multiple other sources that also had conflicting conclusions on the effectiveness of the modality. It also reviewed several factors that may have come into play, including the infrastructure of the online learning environment, instructional quality, the lack of social and in-person interaction, negative emotions, flexibility, and convenience of learning.

The fourth research question investigated if there was a significant difference between the SBA pretest and posttest performance of the students when exposed to two different modes of learning as shown in table 4. A t-test for independent samples was used to statistically analyze the data. The results from the face-to-face and online surveys were initially transformed into z-scores with a mean of 0. This was used since skewness and kurtosis show that the distribution of the numerical data was not normal therefore satisfying the assumption of normality. The results showed a mean difference of -0.2207 in pretest performance between students in online and face-to-face learning environments, with a t-value of -0.1284. The p-value for this test was 0.200, which was above the 0.05 significance threshold. Since the p-value exceeded 0.05, the null hypothesis was accepted, indicating that there were no statistically significant differences between the two groups' performance.

These findings suggested that the students' performance on the SBA pretest was comparable in both online and face-to-face settings. In other words, the instructional modality had no measurable impact on pretest scores. This meant that there were similar levels of understanding and preparedness across both groups at this stage of their academic journey. This comparability in performance was an indication of the effectiveness of both online and face-to-face teaching methods in preparing students for the pretest assessments.

Meanwhile, as shown in table 4, the mean difference of the posttest performance between students in online and face-to-face learning environments was -0.1003, with a t-value of -0.582. The p-value for this test was set to 0.561. This was significantly higher than the conventional significance level of 0.05. Since the p-value exceeded 0.05, the null hypothesis was not rejected. There were no statistically significant differences in the posttest scores of the students both in online and face-to-face settings. The students performed similarly in their SBA posttests regardless of whether they received instruction remotely or in person. The small mean difference of -0.1003 indicated only a minor variation in scores between the two groups, which was not statistically significant. The comparability in posttest results suggested that both online and face-to-face instructional methods were equally effective in preparing students for the posttest content.

Table 4. *Difference in the Pretest and Posttest Performance of the Students*

Pre-test	Mean	SD	Mean Difference	t-value	P-value
Face-to-face	-0.0296	0.944	-0.2207	-0.1284	0.200
Online	0.1911	1.303			
Posttest	Mean	SD	Mean Difference	t-value	P-value
Face-to-face	-0.0134	0.958	-0.1003	-0.582	0.561
Online	0.0869	1.248			

Consequently, this finding supported the idea that students can achieve similar levels of understanding and success on assessments in either learning environment. Table 4 showed the results for the pretest and posttest performance of students. It showed no significant difference between the results of these two learning modes. The academic performance of the students in both modes of learning was comparable. This result refuted some notable studies which were either for or against the effectiveness of online learning. Let us take the studies by Scrimgeour and Huang (2022), Escomes et al. (2021), and Chisadza et al. (2022) as examples. They concluded that online learning consistently decreased student academic performance. Aries, Swinton, and Anderson (2018) also published study that was concluded in the same vein. Their findings indicated that only students enrolled in the face-to-face mode of learning gained significant improvements in their posttest results. On the other end of the spectrum, we have researchers who affirmed the effectiveness of online learning. Researchers such as Cano (2020), as well as Geng and McGinley (2021) presented findings that suggested that online students significantly outperformed students who were under the face-to-face mode of learning.

The fifth research question investigated whether there was a significant relationship between the respondents' profiles and SBA performance, using Pearson product-moment correlation, Point Biserial, and Cramer's V.

Table 5 examined the relationship between various aspects of a student's profile and their performance on the Standards-Based Assessment (SBA) in science. The study examined the relationships between SBA performance and factors that influence student performance, including age, sex, frequency of SBA administration, and GPA, using Pearson's R correlation analysis.

Based on Pearson's r , Point-Biserial, and Cramer's V correlation analyses, there was no significant relationship between the students' demographic characteristics (age, sex, and nationality) and their SBA performance. Several contextual and educational factors may have influenced these results.

Considering the students' age, for example, the correlation coefficients were $r = -0.063$ (pretest) and $r = 0.060$ (posttest), with p -values of 0.286 and 0.309, respectively. This suggested that age was not a significant factor influencing student performance. Two key points were considered when interpreting these data. One example is what Nam (2014) proposed in his study, where age was found to greatly affect a student's ability to achieve academic success. Second was that most students in the population were clustered within the typical age range for their academic level.

In terms of the students' sex, the correlation coefficients were $r = -0.031$ (pretest) and $r = -0.015$ (posttest), with p -values of .598 and .796, respectively. This result showed no relationship between the students' sex and their academic performance. This can be regarded as a measurable indicator of the education sector actively working to minimize gender gaps and offering equal opportunities to support both male and female students. This was previously proposed by the study of Paul and Jefferson (2019) which reported no significant differences between male and female student performance. This was also contradictory to the findings of Tsaousis and Alghamdi (2022), who posited that females tend to outperform male students in academics.

Regarding the students' nationality, coefficient correlations were $r = 0.314$ (pretest) and $r = 0.360$ (posttest), with p-values of 0.350 and 0.310, respectively. These findings demonstrated no significant relationship between nationality and student performance. This study revealed that although students from diverse backgrounds were

Table 5. Correlation between Profile and their Performance

Profile	Pretest		Posttest	
	Correlation Coefficient	P-value	Correlation Coefficient	P-value
Age ^a	-0.063	0.286	0.060	0.309
Sex ^b	-0.031	0.598	-0.015	0.796
Nationality ^c	0.314	0.350	0.360	0.310
GPA ^a	0.414**	<0.001	0.635**	<0.001

Legend: *a* – Pearson *R*, *b* – Point Biserial, *c* – Cramer's *V*

becoming more integrated in the learning environment, it did not significantly impact student performance based from the researcher's findings. This was supported by the study by Banda et al. (2023). It highlighted how the region of origin of students does not define their academic performance. Instead, the study recognized the value of individual student effort. On the other hand, Kirti et al. (2008) presented a differing view, pointing out notable differences in academic performance between Filipino and foreign students, which they attributed to the diversity of their cultural backgrounds.

Examining the frequency of students taking the SBA, the correlation was weak, with results showing $r = 0.34$ (pretest) and $r = 0.006$ (posttest), and corresponding p-values of 0.558 and 0.916. This clearly indicated that it was not statistically a predictor of student performance.

The number of times an assessment was taken does not necessarily lead to better performance. Instead, consistent learning practices and deeper understanding played a more important role in performance by facilitating more meaningful and impressionable learning. Janelli (2019) earlier observed that repeated testing does not notably impact academic performance, supporting the findings derived from the data of this study. This was also in contrast to Weimer (2008), which affirmed that frequent assessment benefits learners by making them familiar with the content, improving feedback, and building confidence.

Since all p-values for the demographic variables discussed exceeded the 0.05 significance threshold, the null hypothesis for all variables regarding taking the SBA is accepted. However, student GPA demonstrated a strong positive correlation with SBA performance, as shown in Table 5. With $r = 0.414$ (pretest) and $r = 0.635$ (posttest), both are statistically significant since $p < 0.0001$. This implied that student GPA, as an indication of cumulative knowledge, study habits, skills, and motivation, influenced the academic success of the students. This result is consistent with Merritt's (2021) study, which concluded that GPA acted as a reliable benchmark of student academic performance across both online and face-to-face mode of learning.

The sixth research question called for the design of an intervention to reduce learning disparities across instruction modalities. To achieve this, the researcher considered the data from fourth and fifth analyses. These results showed that the academic levels remained at a low level or were progressing towards standard levels. There was also an evident GPA gap depending on the mode of instruction. All these underscores the need for targeted interventions to address these disparities.

To help reduce the gap or at least raise performance for both groups, interventions were introduced. These were based on the review of Harackiewicz and Priniski's (2018) study which showcased effective interventions that enhance academic outcomes.

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

This study focused on investigating the students' performance in online and face-to-face Standards-Based Assessment in science as a basis for intervention. The main objective of this study was to uncover any disparities between the two modes of learning, firstly by taking and highlighting the profiles of student respondents that participated; by comparing pre and posttest performance of the students in both modes of learning; and by determining any significant differences and relationships in terms of student performance and profile. By uncovering all of these parameters, this research ultimately formulated and proposed an intervention to mitigate any potential differences and equalize academic opportunities regardless of the mode of learning.

Summary of the Findings

Based on the analysis of the collected data, the researcher identified the following findings.

1. The data indicated that the respondents' ages were well distributed across their appropriate grade levels. The study also revealed that in high school, female students clearly outnumbered their male counterparts. Similarly, the results showed that most participants were Filipinos, some were foreigners, and a small number were half-Filipino students. Finally, students generally performed at high levels in terms of their science GPA. Student grades were concentrated in the categories of Superior, Above Average, and Very Superior. Only a smaller number performed at an average level, and none of the students received low, Average, or Poor grades.
2. The findings of the SBA pretest showed significant variations in performance and score distribution between students exposed to online and face-to-face learning. While both groups showed results at the majority "Progressing towards standards" level, online learning showed a mean slightly higher in this level and a larger proportion reaching the "Highly proficient" level. This meant that, although both modalities were effective in guiding students towards learning, the results showed that online learning still stood out as not only more attainable but also went beyond what was required. On the other hand, face-to-face learning showed a larger percentage of students not meeting the basic standards, which meant that more learners were struggling in this mode of learning.
3. While both groups demonstrated that the majority of students were "Progressing towards standards", online instruction was consistently successful across higher achievement levels. A larger proportion of students reached the "Highly proficient" level. This means that even if both learning modalities helped students achieve their objectives, the online mode of instruction appeared more effective at maintaining learners at the expected proficiency level. Aside from that, it also showed that it enabled a larger portion of students to exceed basic expectations and achieve higher levels of mastery. On the other hand, while face-to-face learning did have a higher percentage of "Proficient and Progressing towards standards" students, it also showed a slightly smaller percentage of students not meeting the basic standards. This implied that while face-to-face learning facilitated acceptable performance for some, the number of learners struggling significantly to meet basic requirements was actually lower in this mode compared to online instruction.
4. The findings from the independent t-tests conducted on both the SBA pretest and posttest performance of students in online and face-to-face learning environments indicated no statistically significant differences between the two groups. Since the p-value exceeded 0.05, the null hypothesis was accepted. This confirmed that there was no significant difference in pretest performance between students in the two learning modes. Similarly, posttest results revealed a p-value that was also greater than 0.05, again af-

firming the null hypothesis. The results showed no significant difference in posttest scores between students in online and face-to-face settings.

5. Using Pearson's R, Point-Biserial, and Cramer's V correlation analyses, the p-values of age, sex, and nationality were all determined to be above the 0.05 significance threshold. Therefore, the null hypothesis, stating that there was no significant relationship between these demographic factors and performance, was accepted. Meanwhile, the students' GPA showed a strong positive correlation with their performance in the SBA. Both correlations had p-values of <0.001 , indicating a strong statistical significance. Therefore, the null hypothesis was rejected for GPA, indicating that it is a significant factor in student performance.
6. The study also emphasized the value of observing the benefits and drawbacks of each learning modality, as this can support a clearer understanding of how both can contribute to a balanced and practical learning experience. Deslauriers et al. (2022) recommended exam preparation, including teaching and assessments, as well as aligning the materials students' study with exam learning goals, to ensure their success. The Standard-Based Assessment (SBA) Pre-intervention and post-intervention provided measurable data on student performance and engagement in both settings, allowing researchers to examine and lessen the gaps between online and face-to-face modalities.

Conclusions

The respondents' ages were well distributed across their appropriate grade levels. In terms of sex, the high school student population was still female-dominated. As for the nationality of students, while the school attracted a diverse range of international students, it was still predominantly attended by Filipinos.

In terms of the GPA of students in science, more high school learners performed better than the average. In the SBA pretest, the majority of both online and face-to-face students attained the "Progressing towards standards" level. However, a larger portion of learners exposed online struggled to meet the basic standards.

On the other hand, students exposed to online learning had a larger proportion of "Highly proficient" compared to face-to-face students. Therefore, the online learning modality was more effective and successful in keeping students on track towards the expected level and even exceeding the standard expectation. In the SBA posttest, most students, both online and face-to-face, achieved the "Progressing towards standards" level.

However, a larger portion of learners who were exposed face-to-face struggled to meet the basic standards. On the other hand, students exposed to online learning had a slightly larger proportion of "Highly proficient" compared to those exposed to face-to-face learning. All in all, this concluded that online learning modality was more effective in empowering students not only to meet but also to exceed the expected skills.

The analysis of pretest and posttest performance showed no statistically significant differences between students in online and face-to-face learning environments. Both modes had similar levels of student preparedness and comparable outcomes. This highlighted the flexibility present in both modes of instruction.

This demonstrated that students can achieve similar results regardless of the learning environment they are in. The results even revealed that the demographic factors of the students, such as age, sex, and nationality, also did not significantly affect their performance on the SBA. This was shown through low correlation coefficients and p-values. However, GPA still proved to be a strong predictor of student performance.

Both the correlation coefficients and p-values for the pretest and posttest showed a significant relationship between GPA and student success. In sum, the SBA results provided insights into performance progress across the two contrasting learning environments. By studying it, it facilitated the mitigation of any disparities between the two classroom modalities.

Recommendations

1. Educational strategies may focus on supporting students' academic growth and improving their GPA, rather than placing too much emphasis on their demographic characteristics, such as age, sex, nationality, and test frequency.
2. Other potential predictors that were not investigated by this study could be explored further, especially those that better explain the variations in SBA performance for both students exposed to online and face-to-face modalities. These may include psychological, behavioral, and environmental factors such as study habits, motivation, attendance, socioeconomic status and support systems.
3. Although both approaches helped students make progress, the minor differences in score distributions, particularly the increase in high-achieving outliers in the online setting, deserve more investigation to determine the underlying cause of these unique achievement trends.
4. Conduct professional development seminars for teachers on the SBA content and its history. This training will enable educators to align their curriculum with SBA requirements, thereby enhancing instructional strategies and improving student performance on assessments.
5. Since the pre- and post-tests SBA results were both "Progressing Towards Standards", which are inconsistent with their GPA in science, the proposed interventions outlined in this research may be implemented, and ongoing evaluations conducted to assess their effectiveness for both online and face-to-face learners exposed to online and face-to-face modalities.

Intervention

The researcher developed proposed intervention plan tables based on Bas & De Vera (2022) Action Plan and Basallo (2021) Intervention Plan (see Appendix G). These systematically outline the framework for measuring and analyzing student performance, whether exposed to online or face-to-face instruction, in the Standard-Based Assessment (SBA).

Pre-Intervention

The objective of the intervention plan below is to assist students who achieved a "Not met standard" in the SBA pretest in obtaining at least a "Proficient" level in the posttest. This table incorporated key components, such as the section and name of the students, time frame, intervention strategies, required resources, progress checks, verification, validation, and the persons involved. This proposed intervention plan was designed to fit the unique goals and objectives of this study.

Standard-Based Assessment (SBA) Pre-Intervention

(Students who got the marks lower than Proficient in SBA Pretest)

Subject: _____	Term: _____
Grade/Level: _____	Teachers: _____

Objectives: The aim of this plan is to help students achieve a better SBA pretest, improve it from "Not met standard" to at least "Proficient" in the posttest.

Section & Students	Time Frame	Support Measures	Resources	Progress Monitoring	Verification	Persons Involved



10-Jade Juan dela Cruz	1st and 2nd Terms (after SBA Pretest)	One-on-one teaching Supervision during seat work and other activities Constant follow up with the par- ents/guardians of the child's progress Constantly providing written and verbal feedback Recom- mend for tutorial	IXL Skills CK12 (Connect K-12) Khan Science MOODLE Weekly review in preparation for SBA Posttest	Recitation Long tests Seat work Quizzes SBA mock test	Attain the score of Pro- ficient to Highly profi- cient in SBA posttest	Subject Teachers Learners Parents/ Guardians
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Prepared by:	Reviewed by:	Approved by:
Date: _____	Date: _____	Date: _____

Post-Intervention

This intervention aimed to enhance the performance of students who achieved lower or no higher than “Proficient” in the SBA posttest. The table below incorporated key components such as section and name of the students, time frame, intervention strategies, needed resources, progress check, verification, validation, and the persons involved. The proposed intervention plan was designed to fit the unique goals and objectives of this study.

Standard-Based Assessment (SBA) Post-Intervention

(Students who got the marks lower than Proficient in SBA Posttest)

Subject: _____	Term: _____
Level: _____	Teachers: _____

Objective: The aim of this plan is to help enhance performance of students who achieved lower than “Proficient” in the SBA posttest.

Section & Students	Time Frame	Support Measures	Resources	Progress Moni- toring	Verification	Persons Involved
10-Newton Juan dela Cruz	Third term (after SBA Posttest)	Giving written and verbal feedback Involve parents and guardians Recommend for	Extended Ac- ademic Year (EAY) Summer Class	Recitation Seat work Quizzes Long tests	Attain a result higher than 90% in the exam.	Subject Teachers Learners Parents/Guardians



		summer class				
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Prepared by:	Reviewed by:	Approved by:
Date: _____	Date: _____	Date: _____

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