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THE DEVELOPMENT OF THE 21ST-CENTURY SKILLS IN MATHEMATICS OF THE SENIOR HIGH SCHOOL LEARNERS IN THE PUBLIC SECONDARY SCHOOLS IN THE DIVISION OF CAMARINES SUR

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ABSTRACT

This descriptive-evaluative-correlational study determined the development of the 21st-century skills in Mathematics of Senior High School (SHS) learners in the public secondary schools of the Division of Camarines Sur for School Year 2025–2026, the teachers' competence in developing these skills, the challenges encountered and solutions offered, the significance of agreement on the rank orders of each set of indicators, and the training design that can be crafted from the findings. A researcher-made, 170-item questionnaire (Kuder-Richardson Formula 21 reliability = 0.812) was answered by 272 SHS teachers from the five congressional districts, chosen through stratified random sampling. Data were treated with weighted mean, rank, and Kendall's Coefficient of Concordance (W) with its chi-square test at the 0.05 level. The learners' 21st-century skills were Much Evident overall (4.47), and Very Much Evident along Competence (4.70) and Communication (4.52); teachers' competence was Much Evident overall (4.47), and Very Much Evident along Interpersonal Relationship (4.70) and Classroom Management (4.52). The challenges were Much Challenging overall (4.47), and Very Much Challenging along Limited Resources (4.70) and Lack of Administrative Support (4.52); the solutions offered were Much Appropriate (4.30), led by sufficient instructional resources, stronger ICT infrastructure, and authentic performance-based assessments. Kendall's W ranged from 0.20 to 0.33, and no computed χ^2 exceeded the tabular value; hence, all three null hypotheses were accepted, indicating no significant agreement on the rank orders among the groups of respondents. A training design was crafted from the findings. It is recommended that supervisors and school heads sustain monitoring and professional development, that teachers share best practices, that Local Government Units allocate resources and technology, and that the training design be implemented.

Keywords: *Development; 21st-century skills in Mathematics; Senior High School learners; Challenges; Solutions*

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Volume 1 Issue 4 Pages 112-160

INTRODUCTION

Background and policy context

Developing 21st-century skills is a key objective of today's education, especially in mathematics, where learners' success depends on critical thinking, problem-solving, teamwork, and technological literacy. For Senior High School (SHS) learners, mastering these skills is essential both for academic success and for dealing with real-world situations in a rapidly changing society. Yet many public secondary schools face challenges in integrating them into mathematics instruction, such as a lack of resources, conventional teaching methods, and inconsistent teacher preparation. Teachers and School Heads are the front liners in the country's commitment to help all citizens reach their full potential.

This commitment is mandated by Article XIV of the 1987 Philippine Constitution ("The state shall protect and promote the right of all citizens to quality education at all levels and shall take the appropriate steps to make such education accessible to all"; Section 5 adds that the State "shall encourage local planning in the development of educational policies and programs") and by Republic Act (RA) 9155 of 2002, which aims to develop Filipino learners with basic competencies in literacy, numeracy, and critical thinking and provides that the school head shall form a team with the teaching personnel to improve the teaching-learning process. RA 10533 (2012), the Enhanced Basic Education Act of 2013, lengthened basic education to 12 years in fulfillment of the Philippines' commitment to Education for All (EFA); the K to 12 Program seeks to produce graduates who are holistically developed with 21st-century skills and prepared for higher education, middle-level skills development, employment, and entrepreneurship. It is pursued within the Basic Education Sector Reform Agenda (BESRA) and supports the EFA objectives, the Sustainable Development Goals (SDGs), and the 5-Point Basic Education Agenda. Related initiatives include Universal Kindergarten, mother-tongue instruction, the Basic Education Learning Continuity Plan (DepEd Order No. 18, s. 2020), and school-based programs such as Project SMILE (Serve with Meaning In Lifelong Education).

In response, DepEd introduced the Enhanced K to 12 Curriculum, a more holistic, competency-based, and learner-centered framework that emphasizes critical thinking, problem-solving, digital literacy, and socio-emotional competencies while ensuring mastery of core subjects. DepEd Order No. 14, s. 2023 (Policy Guidelines on the Enhanced Basic Education Curriculum for SHS) emphasizes "Collaborative Expertise": teachers and school heads work together in professional learning communities to design lessons, integrate interdisciplinary approaches, and reflect on practice, thereby reinforcing teacher motivation, competence, and innovation.

To inform instructional strategies and policy decisions in the Division of Camarines Sur, it is essential to understand the degree to which SHS learners acquire 21st-century skills in Mathematics and the factors that support or impede this development. The average academic achievement of the Division was 62.29% in the 1st Congressional District, 64.11% in the 2nd, 59.39% in the 3rd, 61.29% in the 4th, and 66.95% in the 5th, and its learners have won distinctions in international mathematics competitions (Section 2.2). Nevertheless, no study had yet been conducted on the development of the 21st-century skills in Mathematics of SHS learners in the Division. The researcher, a Master Teacher and Officer-in-Charge directly involved in the supervision of SHS Mathematics classes, is well placed to gather trustworthy data and to propose evidence-based recommendations for improving instruction.

Review of related literature and studies

The review of local and foreign studies found no published study on the development of 21st-century skills in Mathematics of SHS learners in the Division of Camarines Sur. The literature is presented under three headings: development of 21st-century skills in Mathematics, challenges and solutions, and training designs.

Studies on the development of 21st-century skills in Mathematics

Research on 21st-century skills in Mathematics highlights learner-centered instruction, technology integration, project-based learning, and collaborative activities that encourage active engagement and higher-order thinking, and

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identifies teacher competence, instructional resources, and supportive school leadership as key influences. Niss (2022) described the Danish KOM project, which bases mathematics curricula on "mathematical competency" rather than on lists of topics, because society needs a well-educated population able to activate mathematical knowledge in varied contexts. Juadinez (2020) found, in a phenomenographic study of SHS Mathematics teachers in Quezon City, that teaching is geared toward a learner-centered, contextualized curriculum, but that deficiencies in teaching strategies, tools, performance-based activities, training, and textbooks, and learners' lack of mastery of basic skills, limited learning. Madrugar (2020) found in a quasi-experimental study that learners using concrete or virtual manipulatives struggled with the cognitive load of operating them, and concluded that the key to learning mathematics is making connections to previous and real-life experiences. Cordova (2021) described the mathematics competencies expected of entering college learners.

Philippine studies relate to teachers' work in supporting learners' literacy, numeracy, and life skills. Torres (2022), Mendoza (2023), Garcia (2020), and Rivera (2022) found that implementers' commitment, innovative approaches, digital tools, partnerships with local government units (LGUs), community engagement, and individualized learning plans improve outcomes even in remote or resource-constrained areas. Valdez (2023) found that instructional quality directly affects literacy and numeracy outcomes and that training in data-driven instruction is scarce; Santos (2021) and Reyes (2023) found that culturally relevant teaching and local adaptation of the curriculum improve engagement; Hernandez (2021) and Cruz (2020) showed that teachers prepare learners for real-world challenges and act as mentors, facilitators, and curriculum developers. Studies on learning modalities (Thomas, 2023; Robles, 2020; Nepomuceno, 2020; Molina, 2020; Murillo, 2020; Malik, 2020) found that self-directed learning packets and modules allow self-paced learning and can yield comprehension scores comparable to or superior to traditional teaching. Studies on personal and social development (Thompson, 2021; McKay, 2020; Arrieta, 2021; Navarro, 2022; Palisoc, 2020) emphasize self-concept, career guidance, counseling, and school readiness. These studies resemble the present one in focusing on teachers' roles in developing learners' foundational and 21st-century competencies; the present study differs in respondents, locale, and output.

Challenges and solutions

Developing 21st-century skills in Mathematics is hindered, particularly in public schools, by limited resources, inadequate assessment, lack of administrative support, minimal learner engagement, and low technology confidence. Proposed solutions include sufficient instructional materials, capacity-building for pedagogical and technological competence, stronger administrative support for classroom innovation, and activity-based approaches that increase motivation. Studies of school leaders point to resource constraints, policy changes, administrative workload, teacher readiness, and the need to balance managerial and instructional roles (Lopez, 2021; Articulo, 2023; Robinson, 2023; Vanhoof, 2021; Santos, 2023; Espinas, 2021), while principals who shape the instructional environment and support teachers positively influence learner outcomes (Hallinger & Murphy, 2020). Studies on technology and the "new normal" show that blended and flipped learning depend on suitable technologies and good practices (Graham, 2020; Gonda, 2020; Pacheco, 2020), and that the pandemic, which disrupted about 1.6 billion learners in more than 200 countries, also created an opportunity to introduce digital learning (Achenta, 2020; Reyes, 2021; Tria, 2020).

Training designs

Beridico (2022) found that most of 62 public school teachers had only basic knowledge and needed more training; Caluza and Verecio (2022) likewise assessed ICT competencies and recommended training as a basis for a community extension program; Ballesteros and Ocampo (2021) and Davies (2020) documented best practices and technology use among Special Education teachers; Asiyai (2019) identified barriers to ICT use (poor policy attitude, inadequate funding, low ICT literacy) and strategies (electronic classrooms and pedagogical ICT training); and Berdin (2020) formulated training designs to improve learners' performance. Like the present study, these derived or recommended training designs from their findings; the present study differs in respondents, locale, and content.

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Volume 1 Issue 4 Pages 112-160

Synthesis and research gap

The studies reviewed were helpful in making the present study, but none was exactly the same: they showed only similarities or relevant findings, and differed in locale, process, and content. The gap bridged by this study is the determination, in the Division of Camarines Sur, of how SHS learners' 21st-century skills in Mathematics are developed, how teachers' competence relates to that development, what challenges and solutions teachers identify, and what training design follows from these findings.

Theoretical framework

The study was anchored on four theories that deal with individual learning and development.

- **Individual Differences Theory (Kelly, 1969)**: no two individuals are exactly alike; every learner and teacher has distinctive interests, knowledge, and skills.
- **Motivation Theory (Kelly, 1969)**: motives (needs, wants, success) prompt a person to act; learners properly motivated by parents are regular in class attendance.
- **Cognitive Learning Theory (Weitmer, 1972; with Maslow, 1968)**: practice and repeated exposure are more important, and regular practice and genuine love for the subject lead to comprehension and improved achievement.
- **Contingency Theory (Fiedler, 1967)**: a situation is favorable depending on leader–member relations, task structure, and position power; an effective school manager must apply both task and relationship dimensions of leadership.

Researcher's theory. Analyzing the development of the 21st-century skills in Mathematics of SHS learners in the public secondary schools of the Division of Camarines Sur will lead to the formulation of training designs for improved academic performance toward quality education.

Conceptual framework

The conceptual paradigm (Figure 1) is based on the systems approach. The inputs are the legal bases (1987 Philippine Constitution; RA 9155; RA 10533; DepEd Memo No. 50, s. 2020; EFA; BESRA; School-Based Management; SDG; DepEd Vision, Mission, and Goals; Enhanced K to 12 Curriculum; DepEd Orders and Memoranda), theories, related studies, respondents, the instrument, and the statistical tools. The process comprises the eight steps of the study. The output is the training design for a more improved impact of the development of the 21st-century skills in Mathematics of SHS learners toward quality education. A feedback loop makes the training design also an input to future enhancements, informing policymakers, school administrators, and educators.

Figure 1. The conceptual paradigm of the study.

INPUT	PROCESS	OUTPUT
Legal bases: 1987 Philippine Constitution; RA 9155; RA 10533; DepEd Memo No. 50, s. 2020; EFA; BESRA; SBM; 5-Point Agenda; SDGs; Enhanced K to 12	1. Determining the extent of development of the 21st-century skills of SHS learners in Mathematics 2. Testing the significant agreement on the rank orders of the level of development	Training design for a more improved impact of the development of the 21st-century skills in Mathematics of SHS

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Volume 1 Issue 4 Pages 112-160

Curriculum; other DepEd Orders and Memoranda Theories, related literature and studies Respondents Instrument used Statistical tools used	3. Analyzing the extent of the teachers' teaching competence 4. Computing the test of significant agreement on the rank orders of teaching competence 5. Identifying the challenges encountered by the respondents 6. Finding out the solutions offered to address the challenges 7. Assessing the significant agreement on the rank orders of challenges and solutions 8. Crafting the training design based on the findings	learners toward Quality Education
Feedback loop: the training design serves as an output and as an input for future enhancements		

Statement of the problem and objectives

This study determined the development of the 21st-century skills in Mathematics of the SHS learners in the public secondary schools in the Division of Camarines Sur for School Year 2025–2026. Specifically, it sought answers to the following questions:

1. To what extent is the level of development of the 21st-century skills of the SHS learners in Mathematics along Competence, Compassion, Communication, Collaboration, and Character?
2. How significant is the agreement on the rank order of the level of development of these skills?
3. To what extent is the level of the teachers' teaching competence in the development of these skills in terms of Interpersonal Relationship, Instructional Material Development, Classroom Management, and Instructional Competence?
4. How significant is the agreement on the rank orders of the level of the teachers' teaching competence among the different groups of respondents?
5. What challenges were encountered by the respondents in developing these skills, including limited resources, Poor Assessment, Lack of Administrative Support, Minimal Learners' Engagement, and Low Technology Confidence?
6. What solutions were offered to address the challenges encountered?
7. How significant is the agreement on the rank orders of the challenges encountered and the solutions offered?
8. What training design can be crafted based on the findings of the study?

Hypotheses

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Volume 1 Issue 4 Pages 112-160

It was assumed that the extent of development of the skills, the teachers' teaching competence, the challenges, and the solutions can be determined, and that a training design can be crafted from the findings. The study tested the following null hypotheses at the 0.05 level:

1. H_o1: There is no significant agreement on the rank orders of the level of development of the 21st-century skills of the SHS learners in Mathematics along the aforementioned aspects.
2. H_o2: There is no significant agreement on the rank orders of the level of the teachers' teaching competence in the development of the 21st-century skills among the different groups of respondents.
3. H_o3: There is no significant agreement on the rank orders of the challenges encountered and the solutions offered by the respondents.

Significance of the study

The results would be beneficial to the following:

- **Learners and teachers.** Collaborative planning and reflective dialogue between teachers and school heads lead to more coherent, learner-centered strategies, an improved school climate, enhanced learning outcomes and engagement, and teachers' greater confidence, motivation, and shared accountability.
- **School Heads** gain an understanding of classroom realities and of their role as instructional leaders who guide, mentor, and co-create strategies with teachers.
- **DepEd, key officials, curriculum writers, and policymakers** gain evidence for frameworks, policies, targeted support, resource allocation, and flexible, context-sensitive curricula that promote teacher empowerment, distributed leadership, and professional learning communities.
- **LGUs and the Civil Service Commission (CSC)** can align resources, infrastructure, training, and localized programs with schools' needs, and review competency frameworks and appraisal tools for teachers and school heads.
- **Parents, the community, and other stakeholders** are encouraged to support school initiatives and build trust with educators.
- **Future researchers and the researcher herself** obtain a foundation for comparative studies and for professional growth and critical reflection on practice.

Definition of terms

- **Development** is the gradual improvement of learners' abilities, knowledge, and skills; in Mathematics, helping learners understand concepts, solve problems, think critically, and apply what they learn in real life.
- **21st-century skills in Mathematics** are the abilities learners need to succeed today: critical thinking, problem-solving, creativity, communication, collaboration, and effective use of technology. As measured here, they are **Competence** (understanding, applying, and analyzing mathematical concepts accurately), **Compassion** (empathy, peer support, patience), **Communication** (expressing mathematical ideas and solutions clearly), **Collaboration** (working effectively with others toward a common goal), and **Character** (ethical behavior, responsibility, perseverance, integrity).
- **Teaching competence** is measured along **Interpersonal Relationship** (positive, respectful relationships with students, colleagues, and parents), **Instructional Material Development** (designing and using lesson plans, worksheets, visual aids, and digital resources), **Classroom Management** (organizing the classroom

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Volume 1 Issue 4 Pages 112-160

and maintaining discipline in a safe, conducive environment), and **Instructional Competence** (delivering lessons clearly and engaging students actively).

- **Challenges** are difficulties or obstacles that require effort and creativity to overcome: **Limited Resources** (not enough materials, tools, or facilities), **Poor Assessment** (ineffective ways of checking understanding), **Lack of Administrative Support** (insufficient guidance, encouragement, or resources from school leaders), **Minimal Learners' Engagement** (little interest, participation, or motivation), and **Low Technology Confidence** (teachers' lack of skills or assurance in using digital tools).
- **Solution** is a resolution or specific method to address a challenge.
- **Training Design** is the chief product of the study, developed from its findings.

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Volume 1 Issue 4 Pages 112-160

METHODS

This section describes the research design, locale, respondents and sampling, instrument and its validation, data-gathering procedure, ethical safeguards, statistical treatment, and the approach used in crafting the training design.

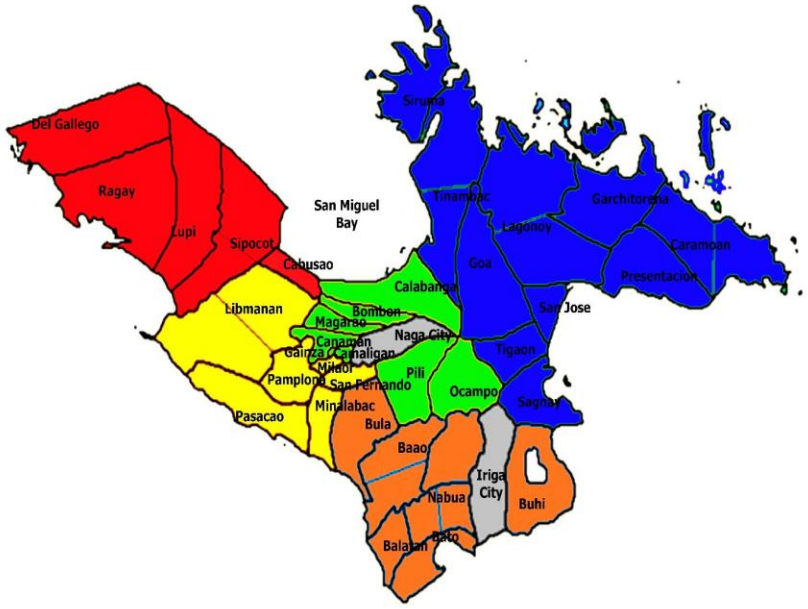
Research design

The study utilized the descriptive-evaluative-correlational method of research. The descriptive method was used to gather information about existing conditions; its principal aims are to describe the nature of a situation as it exists at the time of the study and to explore the causes of particular phenomena. According to Subong and Beldia (2005), descriptive research involves the collection of data to answer questions concerning the current status of the study, and for Best (1990), the descriptive method describes what is and allows an in-depth analysis of the conditions being looked into. The correlational method was used to determine the significant agreement on the rank orders of (a) the level of development of the 21st-century skills of the SHS learners in Mathematics along the aforementioned aspects, (b) the level of the teachers' teaching competence in the development of these skills among the different groups of respondents, and (c) the challenges encountered and the solutions offered by the respondents.

Locale of the study

The five (5) Congressional Districts of the Division of Camarines Sur served as the locale of the study (Figure 2); purposive sampling was used in choosing the locale. The Division is headed by a Schools Division Superintendent (SDS) and is supported by three (3) Assistant Schools Division Superintendents, two (2) Chief Education Supervisors (for the Curriculum Implementation Division, CID, and the School Governance and Operations Division, SGOD), ten (10) Education Program Supervisors, thirty-eight (38) Public Schools District Supervisors (PSDSs), eight hundred forty-eight (848) School Heads, and six thousand seven hundred sixty-three (6,763) teachers. Table 1 shows the number of schools, teachers, and learners per district as reported for each congressional district.

Figure 2. The school location map of the Division of Camarines Sur. Source: Province of Camarines Sur.



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Volume 1 Issue 4 Pages 112-160

Table 1. **Number of Schools, Teachers, and Learners by Congressional District of the Division of Camarines Sur**

District	Schools	Teachers	Learners
First Congressional District	133	727	35,754
Second Congressional District	159	1401	48,644
Third Congressional District	113	1078	33,239
Fourth Congressional District	272	1893	74,367
Fifth Congressional District	171	1827	62,852
TOTAL	848	6926	254,856

Note. Totals are computed from the municipal figures reported by the Division for each district.

The Division continues to produce quality learners in academics, culture, and sports at national and international levels, including winners in international mathematics competitions in Hong Kong (e.g., Aeron Dann Penaflorida, Mia Joy Q. Formalejo, Arjun Rei Cabarles, and Godwin D. Ediza). The average academic achievement was 62.29% (1st District), 64.11% (2nd), 59.39% (3rd), 61.29% (4th), and 66.95% (5th). To further improve performance, the DepEd Computerization Program provided computer sets to 78 schools (Batch 16) and 105 public schools (Batch 19), and equipped 21 mobile teachers of the Alternative Learning System (ALS) with laptops, LCD projectors, and online learning resources. Through its flagship program CAMSUR (Convergence of committed public servants; Accountable; Make things happen; Serves with a Smile; Understands DepEd Vision, Mission, and Objectives; Responsible for rights-based education and results-based performance), the SDO aims for highly competent teachers and school heads, strengthened DepEd programs, linkages with government and non-government organizations, and full parental support.

Respondents and sampling

The respondents were the SHS teachers in the five (5) Congressional Districts of the Division of Camarines Sur. Stratified random sampling was employed in choosing the respondents, and the adequacy of the sample was determined with Slovin's formula (1976), $n = N / (1 + Ne^2)$, where n is the desired sample, N is the population universe, 1 is a constant, and e is the margin of error (0.05). Table 2 shows the distribution of the respondents. Of the 848 SHS teachers in the five districts, 272 were respondents: 43 from the First, 51 from the Second, 36 from the Third, 87 from the Fourth, and 55 from the Fifth Congressional District. They were asked to give honest responses to the distributed questionnaire, and their responses were needed to answer the problems of the study and to formulate the training design.

Table 2. **The Respondents of the Study**

Congressional District	Population	Respondents	Percentage
1. First Congressional District	133	43	16
2. Second Congressional District	159	51	18

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Volume 1 Issue 4 Pages 112-160

Congressional District	Population	Respondents	Percentage
3. Third Congressional District	113	36	12
4. Fourth Congressional District	272	87	34
5. Fifth Congressional District	171	55	20
GRAND TOTAL	848	272	100

The delimitation of the study was set to the SHS teacher-respondents in the Division of Camarines Sur and to their responses to the questionnaire for School Year 2025–2026. The study covered the extent of development of the 21st-century skills, the test of agreement on rank orders, the teachers' teaching competence, the challenges and solutions, and the training design, as stated in Section 1.5.

Research instrument

A researcher-made questionnaire for the SHS teachers, composed of one hundred seventy (170) items, was prepared following the Table of Specifications (Table 3). Part I (55 items) covers the extent of development of the 21st-century skills of the SHS learners in Mathematics; Part II (47 items), the extent of the teachers' teaching competence in developing these skills; Part III (55 items), the challenges encountered; and Part IV (13 items), the solutions offered to address the challenges. Respondents encircled the number that best indicated their degree of agreement with each statement; an "Others (please specify)" line was provided for each indicator group. The indicators are those listed in the tables of the Results section. Responses were interpreted using the rating scales in Table 4.

Table 3. Table of Specifications of the Questionnaire

Content	No. of Items	Item Placement	Percentage
Part I. Extent of the level of development of the 21st-century skills of the SHS learners in Mathematics			
1. Competence	12	1–12	7
2. Compassion	11	13–23	6
3. Communication	10	24–33	6
4. Collaboration	13	34–46	8
5. Character	9	47–55	5
Subtotal	55		32
Part II. Extent of the level of the teachers' teaching competence in the development of the 21st-century skills			
1. Interpersonal Relationship	12	56–67	7
2. Instructional Material Development	11	68–78	6

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Volume 1 Issue 4 Pages 112-160

Content	No. of Items	Item Placement	Percentage
3. Classroom Management	10	79–88	6
4. Instructional Competence	13	89–101	8
Subtotal	47		28
Part III. Challenges encountered in developing the 21st-century skills in Mathematics of the SHS learners			
1. Limited Resources	12	102–114	7
2. Poor Assessment	11	115–125	6
3. Lack of Administrative Support	10	126–135	6
4. Minimal Learners' Engagement	13	136–148	8
5. Low Technology Confidence	9	149–157	5
Subtotal	55		32
Part IV. Solutions offered to address the challenges encountered			
Solutions offered	13	158–170	8
GRAND TOTAL	170		100

Table 4. Rating Scales Used to Interpret the Weighted Means

Range	Extent (Parts I–II)	Challenges (Part III)	Solutions (Part IV)
4.50–5.00	Very Much Evident (VME)	Very Much Challenging (VMC)	Very Much Appropriate (VMA)
3.50–4.49	Much Evident (ME)	Much Challenging (MC)	Much Appropriate (MA)
2.50–3.49	Evident (E)	Challenging (C)	Appropriate (A)
1.50–2.49	Fairly Evident (FE)	Fairly Challenging (FC)	Fairly Appropriate (FA)
1.00–1.49	Not At All (NAA)	Not At All (NAA)	Not At All (NAA)

Validity and reliability of the instrument

The questionnaire was validated by SHS teachers in the Division of Camarines Sur, who answered it and made comments and suggestions that were accepted in revising the instrument. To secure validity, a group of professors of the University of Northeastern Philippines set the rating scale and improved the instrument. Their suggestions were

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Volume 1 Issue 4 Pages 112-160

reflected in the instrument, printed, and shown to the adviser, whose suggestions and revisions were again reflected; the researcher was then given the go-ahead to print the instrument for distribution to the target respondents.

To measure internal consistency, Kuder-Richardson Formula 21 (Deidreich, 1976) was used after retrieval of the questionnaire: $r = 1 - [M(N - M)] / [N(s^2)]$, where r is the reliability coefficient, M the mean, N the number of items, and s the standard deviation. With a mean of 4.28, a highest scale value of 5, and a standard deviation of 1.96, the reliability was 0.812. The significance of the reliability coefficient was tested at the 0.05 level with $t = r\sqrt{(n - 2)} / \sqrt{(1 - r^2)}$ (Freund, 1998); the computed t of 5.08 exceeded the tabular criterion at 0.05 and also at 0.001, which enabled the researcher to state that the instrument was highly reliable.

Data-gathering procedure

The researcher submitted the proposal and title for defense, drafted, validated, and evaluated the instrument, secured permission to conduct the study, disseminated and retrieved the instrument, tabulated, presented, and analyzed the data, went through the pre-oral and final defenses, incorporated the panelists' recommendations, submitted the training design to the authorities, and published the research output. These activities were scheduled between 2025 and 2026.

Ethical considerations

A permit to conduct the study was requested from the Schools Division Superintendent through the proper channels, with the approval of the Dean of Graduate Studies. The respondents were assured that all data collected would be treated with strict confidentiality, that responses would be used for research purposes only, that no school or respondent would be identified in the final report, and that supplying a name on the questionnaire was optional.

Statistical treatment

Frequency count, percentage, weighted mean, rank, and Kendall's Coefficient of Concordance (W) were used.

- **Weighted mean** was used to quantify the data and make the interpretation more objective in determining the development of the 21st-century skills in Mathematics, the teachers' teaching competence, the challenges, and the solutions, and in validating the output of the study.
- **Kendall's Coefficient of Concordance (W)** was used to determine the significant agreement on the rank orders in the three sets of hypotheses (Siegel, 1988): $W = S / [(1/12)k^2(N^3 - N)]$, where W is Kendall's coefficient of concordance, S is the sum of the squared deviations from the mean of the rank sums, k is the number of groups of respondents (here, the five congressional districts), and N is the number of cases (indicators).
- **Chi-square test.** The significance of agreement among the rank orders of the groups was tested with $\chi^2 = k(N - 1)W$ (Siegel, 1988), where χ^2 is the chi-square value, k the number of groups, N the number of indicators, and W the coefficient of concordance. The significance level was set at 0.05.

Development of the training design

The training design was crafted from the findings of the study. For each set of indicators, the lowest-ranked indicators of learner skills and teaching competence, and the highest-ranked challenges and solutions, were identified, and a training module was formulated to address each (Section 3.6). The resulting design is summarized in Appendix B.

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Volume 1 Issue 4 Pages 112-160

RESULTS

The results are presented in the order of the specific questions of the study. In every table, Wx is the weighted mean, Int the interpretation, and R the rank of the indicator within the congressional district; the last three columns give the average across the five districts. Interpretations follow the rating scales in Table 4.

Extent of development of the 21st-century skills of the SHS learners in Mathematics

Competence

All eleven indicators were rated Very Much Evident (VME), in descending order: learners understand basic mathematical concepts (4.89); they show critical thinking in solving equations (4.79); they can compute accurately in most problems (4.77); some can work independently with minimal help (4.75); learners can analyze mathematical patterns (4.73); they apply problem-solving strategies effectively (4.72); they show confidence in answering math questions (4.70); learners use logical reasoning in finding solutions (4.69); they participate actively during math discussions (4.62); they can identify errors and correct them (4.56); and learners can connect math to real-life situations (4.50). The average weighted mean was 4.70 (VME) (Table 5).

Table 5. The Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics along Competence

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. They can identify errors and correct them.	4.14	ME	11	4.73	VME	5.5	5.00	VME	4.5	4.62	VME	10	4.33	ME	8	4.56	VME	10
2. They can compute accurately in most problems.	4.71	VME	7.5	4.91	VME	2	5.00	VME	4.5	4.87	VME	3	4.38	ME	6	4.77	VME	3
3. They show critical thinking in solving equations.	5.00	VME	2.5	4.64	VME	7.5	5.00	VME	4.5	4.88	VME	2	4.45	ME	3	4.79	VME	2
4. Learners can analyze mathematical patterns.	4.71	VME	7.5	4.82	VME	3.5	5.00	VME	4.5	4.84	VME	5	4.30	ME	10	4.73	VME	5
5. They apply problem-solving strategies effectively.	4.57	VME	10	4.82	VME	3.5	5.00	VME	4.5	4.80	VME	6.5	4.40	ME	5	4.72	VME	6
6. Learners can connect math to real-life situations.	4.71	VME	7.5	4.18	ME	11	4.60	VME	10.5	4.50	VME	11	4.50	VME	1	4.50	VME	11

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
7. They show confidence in answering math questions.	5.00	VME	2.5	4.64	VME	7.5	4.60	VME	10.5	4.75	VME	8	4.49	ME	2	4.70	VME	7
8. Some can work independently with minimal help.	5.00	VME	2.5	4.55	VME	9	5.00	VME	4.5	4.85	VME	4	4.35	ME	7	4.75	VME	4
9. Learners understand basic mathematical concepts.	5.00	VME	2.5	5.00	VME	1	5.00	VME	4.5	5.00	VME	1	4.43	ME	4	4.89	VME	1
10. Learners use logical reasoning in finding solutions.	4.86	VME	5	4.73	VME	5.5	4.80	VME	9	4.80	VME	6.5	4.25	ME	11	4.69	VME	8
11. They participate actively during math discussions.	4.71	VME	7.5	4.36	ME	10	5.00	VME	4.5	4.69	VME	9	4.32	ME	9	4.62	VME	9
Average Weighted Mean	**4.76**	**VME**		**4.67**	**VME**		**4.91**	**VME**		**4.78**	**VME**		**4.38**	**ME**		**4.70**	**VME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Compassion

The indicator rated VME was "learners show care to classmates who need help" (4.54). The rest were rated Much Evident (ME), in descending order: they show kindness during peer activities (4.47); learners encourage others during math challenges (4.44); learners celebrate the success of their groupmates (4.44); learners assist others in understanding lessons (4.44); they avoid mocking those who make mistakes (4.37); they patiently explain lessons to peers (4.35); they show willingness to share materials and time (4.33); learners listen attentively to others' opinions (4.31); and they respect the learning pace of their classmates (4.24). The average weighted mean was 4.39 (ME) (Table 6).

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Table 6. The Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics along Compassion

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Learners listen attentively to others' opinions.	4.61	VME	2	4.25	ME	8	4.23	ME	8	4.20	ME	8	4.27	ME	8	4.31	ME	9
2. They patiently explain lessons to peers.	4.39	ME	3.5	4.25	ME	8	4.20	ME	10	4.55	VME	1	4.35	ME	6	4.35	ME	7
3. Learners encourage others during math challenges.	4.20	ME	10	4.75	VME	3	4.25	ME	7	4.35	ME	2	4.65	VME	3	4.44	ME	4
4. They respect the learning pace of their classmates.	4.39	ME	3.5	4.20	ME	10	4.21	ME	9	4.20	ME	8	4.20	ME	10	4.24	ME	10
5. Learners celebrate the success of their groupmates.	4.22	ME	8	4.75	VME	3	4.60	VME	1.5	4.20	ME	8	4.44	ME	5	4.44	ME	4
6. They show kindness during peer activities.	4.21	ME	9	4.75	VME	3	4.28	ME	5	4.29	ME	3	4.83	VME	1	4.47	ME	2
7. Learners assist others in understanding lessons.	4.31	ME	6	4.50	VME	6	4.45	ME	4	4.20	ME	8	4.72	VME	2	4.44	ME	4
8. They avoid mocking those who make mistakes.	4.22	ME	7	4.75	VME	3	4.26	ME	6	4.28	ME	4	4.34	ME	7	4.37	ME	6
9. Learners show care to classmates who need help.	4.67	VME	1	4.75	VME	3	4.55	VME	3	4.27	ME	5	4.48	ME	4	4.54	VME	1
10. They show willingness to share materials and time.	4.34	ME	5	4.25	ME	8	4.60	VME	1.5	4.20	ME	8	4.26	ME	9	4.33	ME	8
Average Weighted Mean	**4.36**	**ME**		**4.52**	**VME**		**4.36**	**ME**		**4.27**	**ME**		**4.45**	**ME**		**4.39**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

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Communication

Rated VME, in descending order, were: learners listen carefully to the teacher's instructions (4.63); they ask questions when confused (4.61); learners participate actively in oral recitations (4.54); learners can explain their math solutions clearly (4.52); and learners communicate well during group reporting (4.50). Rated ME were: they can present their ideas confidently (4.49); they can express their reasoning step by step (4.48); learners use proper math terms in discussions (4.47); and they can defend their answers with evidence (4.46). The average weighted mean was 4.52 (VME) (Table 7).

Table 7. The Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics along Communication

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Learners can explain their math solutions clearly.	4.40	ME	6.5	4.50	VME	5.5	4.50	VME	4.5	4.60	VME	1.5	4.60	VME	6	4.52	VME	4
2. They can express their reasoning step by step.	4.40	ME	6.5	4.53	VME	3.5	4.50	VME	4.5	4.52	VME	4	4.45	ME	9	4.48	ME	7
3. Learners listen carefully to the teacher's instructions.	4.53	VME	2.5	4.63	VME	1.5	4.67	VME	2	4.60	VME	1.5	4.71	VME	3	4.63	VME	1
4. They ask questions when confused.	4.47	ME	4	4.63	VME	1.5	4.83	VME	1	4.50	VME	5.5	4.60	VME	6	4.61	VME	2
5. Learners use proper math terms in discussions.	4.60	VME	1	4.44	ME	9	4.33	ME	8	4.43	ME	8.5	4.50	VME	8	4.47	ME	8
6. They can present their ideas confidently.	4.53	VME	2.5	4.45	ME	7.5	4.33	ME	8	4.43	ME	8.5	4.70	VME	4	4.49	ME	6
7. They can defend their answers with evidence.	4.33	ME	9	4.45	ME	7.5	4.33	ME	8	4.45	ME	7	4.73	VME	1	4.46	ME	9
8. Learners participate actively in oral recitations.	4.40	ME	6.5	4.53	VME	3.5	4.50	VME	4.5	4.53	VME	3	4.72	VME	2	4.54	VME	3
9. Learners communicate well during group reporting.	4.40	ME	6.5	4.50	VME	5.5	4.50	VME	4.5	4.50	VME	5.5	4.60	VME	6	4.50	VME	5

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
Average Weighted Mean	**4.45**	**ME**		**4.52**	**VME**		**4.50**	**VME**		**4.51**	**VME**		**4.61**	**VME**		**4.52**	**VME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Collaboration

All twelve indicators were rated ME, in descending order: learners build trust within their math teams (4.44); they share tasks fairly among members (4.35); they listen to one another's suggestions (4.34); they contribute ideas during brainstorming (4.34); they show leadership when needed (4.34); learners enjoy working in math groups (4.33); learners take turns in presenting group answers (4.30); learners cooperate in solving group problems (4.28); they support each other in completing activities (4.23); they respect different opinions in discussions (4.22); learners maintain harmony during group work (4.21); and learners value teamwork in reaching solutions (4.20). The average weighted mean was 4.30 (ME) (Table 8).

Table 8. The Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics along Collaboration

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Learners enjoy working in math groups.	4.44	ME	11	4.01	ME	10.5	4.51	VME	2	4.08	ME	11	4.63	VME	5	4.33	ME	6
2. They share tasks fairly among members.	4.38	ME	2.5	4.26	ME	5	4.15	ME	9.5	4.38	ME	3	4.60	VME	6	4.35	ME	2
3. Learners cooperate in solving group problems.	4.13	ME	8	4.26	ME	5	4.17	ME	6	4.19	ME	6	4.65	VME	4	4.28	ME	8
4. They listen to one another's suggestions.	4.38	ME	2.5	4.01	ME	10.5	4.51	VME	2	4.30	ME	4	4.50	VME	7	4.34	ME	4

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
5. Learners value teamwork in reaching solutions.	4.00	ME	12	4.01	ME	10.5	4.15	ME	9.5	4.15	ME	12	4.70	VME	1	4.20	ME	12
6. They respect different opinions in discussions.	4.30	ME	4	4.01	ME	10.5	4.15	ME	9.5	4.15	ME	8.5	4.48	ME	8	4.22	ME	10
7. Learners take turns in presenting group answers.	4.19	ME	6.5	4.13	ME	8	4.33	ME	4.5	4.15	ME	8.5	4.68	VME	2.5	4.30	ME	7
8. They contribute ideas during brainstorming.	4.19	ME	6.5	4.26	ME	5	4.33	ME	4.5	4.26	ME	5	4.68	VME	2.5	4.34	ME	4
9. Learners build trust within their math teams.	4.10	ME	10	4.63	VME	1.5	4.51	VME	2	4.53	VME	1	4.45	ME	10	4.44	ME	1
10. They show leadership when needed.	4.25	ME	5	4.63	VME	1.5	4.15	ME	9.5	4.41	ME	2	4.25	ME	12	4.34	ME	4
11. Learners maintain harmony during group work.	4.10	ME	10	4.26	ME	5	4.15	ME	9.5	4.15	ME	8.5	4.40	ME	11	4.21	ME	11
12. They support each other in completing activities.	4.10	ME	10	4.26	ME	5	4.15	ME	9.5	4.15	ME	8.5	4.48	ME	9	4.23	ME	9
Average Weighted Mean	**4.21**	**ME**		**4.23**	**ME**		**4.27**	**ME**		**4.23**	**ME**		**4.61**	**VME**		**4.30**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Character

Rated VME were: they value discipline in submitting outputs on time (4.51), and they demonstrate fairness during group grading (4.50). Rated ME were: learners follow classroom rules and guidelines (4.49); learners are responsible in completing assignments (4.48); learners show humility when corrected (4.47); learners accept mistakes and learn from them (4.42); they respect teachers and classmates alike (4.41); learners show honesty during exams and activities (4.40); and they show perseverance in solving hard problems (4.37). The average weighted mean was 4.45 (ME) (Table 9).

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Volume 1 Issue 4 Pages 112-160

Table 9. The Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics along Character

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Learners show honesty during exams and activities.	4.67	VME	1	4.40	ME	8	4.33	ME	7	4.40	ME	7	4.37	ME	9	4.40	ME	8
2. They value discipline in submitting outputs on time.	4.60	VME	3.5	4.51	VME	1	4.33	ME	7	4.50	VME	2	4.40	ME	8	4.51	VME	1
3. Learners follow classroom rules and guidelines.	4.60	VME	3.5	4.49	ME	3	4.67	VME	2	4.49	ME	3.5	4.49	ME	3	4.49	ME	3
4. They show perseverance in solving hard problems.	4.47	ME	8.5	4.37	ME	9	4.33	ME	7	4.36	ME	9	4.51	VME	1	4.37	ME	9
5. Learners accept mistakes and learn from them.	4.53	VME	6.5	4.42	ME	6	4.33	ME	7	4.40	ME	7	4.42	ME	6	4.42	ME	6
6. They respect teachers and classmates alike.	4.60	VME	3.5	4.41	ME	7	4.33	ME	7	4.40	ME	7	4.41	ME	7	4.41	ME	7
7. Learners are responsible in completing assignments.	4.47	ME	8.5	4.48	ME	4	4.67	VME	2	4.49	ME	3.5	4.48	ME	4	4.48	ME	4
8. They demonstrate fairness during group grading.	4.53	VME	6.5	4.50	VME	2	4.67	VME	2	4.51	VME	1	4.50	VME	2	4.50	VME	2
9. Learners show humility when corrected.	4.60	VME	3.5	4.47	ME	5	4.50	VME	4	4.48	ME	5	4.47	ME	5	4.47	ME	5
Average Weighted Mean	**4.56**	**VME**		**4.45**	**ME**		**4.46**	**ME**		**4.45**	**ME**		**4.45**	**ME**		**4.45**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Summary of the extent of development of the 21st-century skills

In descending order, Competence (4.70) and Communication (4.52) were rated VME, while Character (4.45), Compassion (4.39), and Collaboration (4.30) were rated ME (Table 10). The overall average weighted mean was 4.47 (ME).

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Table 10. The Summary of the Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Competence	4.76	VME	1	4.67	VME	1	4.91	VME	1	4.78	VME	1	4.38	ME	5	4.70	VME	1
2. Compassion	4.36	ME	4	4.52	VME	2.5	4.36	ME	4	4.27	ME	4	4.45	ME	3.5	4.39	ME	4
3. Communication	4.45	ME	3	4.52	VME	2.5	4.50	VME	2	4.51	VME	2	4.61	VME	1.5	4.52	VME	2
4. Collaboration	4.21	ME	5	4.23	ME	5	4.27	ME	5	4.23	ME	5	4.61	VME	1.5	4.30	ME	5
5. Character	4.56	VME	2	4.45	ME	4	4.46	ME	3	4.45	ME	3	4.45	ME	3.5	4.45	ME	3
Average Weighted Mean	**4.47**	**ME**		**4.48**	**ME**		**4.50**	**VME**		**4.45**	**ME**		**4.50**	**VME**		**4.47**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Agreement on the rank orders of the development of the 21st-century skills (Question 2)

The sums of squared deviations from the mean were 809 (Competence), 415.5 (Compassion), 482.5 (Communication), 706 (Collaboration), and 497.5 (Character). Kendall's W and the computed χ^2 were: Competence, 0.30 and 14.50; Compassion, 0.20 and 9.00; Communication, 0.32 and 12.80; Collaboration, 0.20 and 11.00; and Character, 0.33 and 13.20 (all $p > 0.05$). The computed χ^2 values did not exceed the tabular values at the 0.05 level; hence, the null hypothesis ($H_0 1$) was accepted: there is no significant agreement on the rank orders (Table 11).

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Table 11. The Test of Significant Agreement on the Rank Orders of the Extent of the Level of the Development of the 21st-Century Skills of the SHS Learners in Mathematics

Indicator	Competence	Compassion	Communication	Collaboration	Character
Summation of the squared deviation from the mean (S)	809	415.5	482.5	706	497.5
Number of indicators (N)	11	10	9	12	9
Coefficient of Concordance (W)	0.30	0.20	0.32	0.20	0.33
Computed χ^2	14.50	9.00	12.80	11.00	13.20
Degrees of freedom	10	9	8	11	8
Tabular χ^2 at 0.05	18.31	16.92	15.51	19.68	15.51
Tabular χ^2 at 0.025	21.16	19.68	18.17	21.92	18.17
Tabular χ^2 at 0.01	23.21	21.67	20.09	24.72	20.09
Tabular χ^2 at 0.005	25.19	23.59	21.95	26.76	21.95
Tabular χ^2 at 0.001	29.59	27.88	26.12	31.26	26.12
Decision on H_0	**Accepted**	**Accepted**	**Accepted**	**Accepted**	**Accepted**
Significance of agreement	**Not significant**	**Not significant**	**Not significant**	**Not significant**	**Not significant**

Note. k = 5 groups (congressional districts); $\chi^2 = k(N - 1)W$. Tabular values are not exceeded at $\alpha = 0.05$.

Extent of the teachers' teaching competence in the development of the 21st-century skills

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Volume 1 Issue 4 Pages 112-160

Interpersonal Relationship

All eleven indicators were rated VME, in descending order: teachers use positive reinforcement effectively (4.89); teachers listen to learners' concerns and feedback (4.79); they show respect and fairness to all learners (4.77); they motivate learners to participate actively (4.75); they promote a friendly and open classroom atmosphere (4.73); teachers build trust through consistent communication (4.72); teachers show empathy and understanding toward learners (4.70); they encourage teamwork among learners (4.69); teachers handle conflicts calmly and professionally (4.62); teachers maintain good rapport with their learners (4.56); and they maintain harmonious relationships with colleagues (4.50). The average weighted mean was 4.70 (VME) (Table 12).

Table 12. The Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills in terms of Interpersonal Relationship

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Teachers maintain good rapport with their learners.	4.14	ME	11	4.73	VME	5.5	5.00	VME	4.5	4.62	VME	10	4.33	ME	8	4.56	VME	10
2. They show respect and fairness to all learners.	4.71	VME	7.5	4.91	VME	2	5.00	VME	4.5	4.87	VME	3	4.38	ME	6	4.77	VME	3
3. Teachers listen to learners' concerns and feedback.	5.00	VME	2.5	4.64	VME	7.5	5.00	VME	4.5	4.88	VME	2	4.45	ME	3	4.79	VME	2
4. They promote a friendly and open classroom atmosphere.	4.71	VME	7.5	4.82	VME	3.5	5.00	VME	4.5	4.84	VME	5	4.30	ME	10	4.73	VME	5
5. Teachers build trust through consistent communication.	4.57	VME	10	4.82	VME	3.5	5.00	VME	4.5	4.80	VME	6.5	4.40	ME	5	4.72	VME	6
6. They maintain harmonious relationships with colleagues.	4.71	VME	7.5	4.18	ME	11	4.60	VME	10.5	4.50	VME	11	4.50	VME	1	4.50	VME	11
7. Teachers show empathy and understanding toward learners.	5.00	VME	2.5	4.64	VME	7.5	4.60	VME	10.5	4.75	VME	8	4.49	ME	2	4.70	VME	7

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
8. They motivate learners to participate actively.	5.00	VME	2.5	4.55	VME	9	5.00	VME	4.5	4.85	VME	4	4.35	ME	7	4.75	VME	4
9. Teachers use positive reinforcement effectively.	5.00	VME	2.5	5.00	VME	1	5.00	VME	4.5	5.00	VME	1	4.43	ME	4	4.89	VME	1
10. They encourage teamwork among learners.	4.86	VME	5	4.73	VME	5.5	4.80	VME	9	4.80	VME	6.5	4.25	ME	11	4.69	VME	8
11. Teachers handle conflicts calmly and professionally.	4.71	VME	7.5	4.36	ME	10	5.00	VME	4.5	4.69	VME	9	4.32	ME	9	4.62	VME	9
Average Weighted Mean	**4.76**	**VME**		**4.67**	**VME**		**4.91**	**VME**		**4.78**	**VME**		**4.38**	**ME**		**4.70**	**VME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Instructional Material Development

The indicator "they adapt materials based on learners' skill levels" was rated VME (4.54). Rated ME were: they design activities that promote creativity (4.47); teachers create engaging and interactive materials (4.44); teachers integrate 21st-century skills into their materials (4.44); teachers use real-life examples in their materials (4.44); they update instructional aids regularly (4.37); they use visuals and digital tools to enhance lessons (4.35); they prepare learning kits for differentiated instruction (4.33); teachers prepare instructional materials suited to learners' needs (4.31); and teachers use multimedia presentations effectively (4.24). The average weighted mean was 4.39 (ME) (Table 13).

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Volume 1 Issue 4 Pages 112-160

Table 13. The Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills in terms of Instructional Material Development

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Teachers prepare instructional materials suited to learners' needs.	4.61	VME	2	4.25	ME	8	4.23	ME	8	4.20	ME	8	4.27	ME	8	4.31	ME	9
2. They use visuals and digital tools to enhance lessons.	4.39	ME	3.5	4.25	ME	8	4.20	ME	10	4.55	VME	1	4.35	ME	6	4.35	ME	7
3. Teachers create engaging and interactive materials.	4.20	ME	10	4.75	VME	3	4.25	ME	7	4.35	ME	2	4.65	VME	3	4.44	ME	4
4. Teachers use multimedia presentations effectively.	4.39	ME	3.5	4.20	ME	10	4.21	ME	9	4.20	ME	8	4.20	ME	10	4.24	ME	10
5. Teachers integrate 21st- century skills into their materials.	4.22	ME	8	4.75	VME	3	4.60	VME	1.5	4.20	ME	8	4.44	ME	5	4.44	ME	4
6. They design activities that promote creativity.	4.21	ME	9	4.75	VME	3	4.28	ME	5	4.29	ME	3	4.83	VME	1	4.47	ME	2
7. Teachers use real-life examples in their materials.	4.31	ME	6	4.50	VME	6	4.45	ME	4	4.20	ME	8	4.72	VME	2	4.44	ME	4
8. They update instructional aids regularly.	4.22	ME	7	4.75	VME	3	4.26	ME	6	4.28	ME	4	4.34	ME	7	4.37	ME	6
9. They adapt materials based on learners' skill levels.	4.67	VME	1	4.75	VME	3	4.55	VME	3	4.27	ME	5	4.48	ME	4	4.54	VME	1
10. They prepare learning kits for differentiated instruction.	4.34	ME	5	4.25	ME	8	4.60	VME	1.5	4.20	ME	8	4.26	ME	9	4.33	ME	8
Average Weighted Mean	**4.36**	**ME**		**4.52**	**VME**		**4.36**	**ME**		**4.27**	**ME**		**4.45**	**ME**		**4.39**	**ME**	

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Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Classroom Management

Rated VME were: teachers handle misbehavior fairly and consistently (4.63); they create a positive and respectful learning environment (4.61); they encourage learner participation and cooperation (4.54); teachers maintain order and discipline in the classroom (4.52); and teachers use strategies to minimize distractions (4.50). Rated ME were: they manage class time efficiently (4.49); they establish clear rules and routines (4.48); teachers ensure safety and comfort for all learners (4.47); and teachers keep learners focused and engaged (4.46). The average weighted mean was 4.52 (VME) (Table 14).

Table 14. The Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills in terms of Classroom Management

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Teachers maintain order and discipline in the classroom.	4.40	ME	6.5	4.50	VME	5.5	4.50	VME	4.5	4.60	VME	1.5	4.60	VME	6	4.52	VME	4
2. They establish clear rules and routines.	4.40	ME	6.5	4.53	VME	3.5	4.50	VME	4.5	4.52	VME	4	4.45	ME	9	4.48	ME	7
3. Teachers handle misbehavior fairly and consistently.	4.53	VME	2.5	4.63	VME	1.5	4.67	VME	2	4.60	VME	1.5	4.71	VME	3	4.63	VME	1
4. They create a positive and respectful learning environment.	4.47	ME	4	4.63	VME	1.5	4.83	VME	1	4.50	VME	5.5	4.60	VME	6	4.61	VME	2
5. Teachers ensure safety and comfort for all learners.	4.60	VME	1	4.44	ME	9	4.33	ME	8	4.43	ME	8.5	4.50	VME	8	4.47	ME	8
6. They manage class time efficiently.	4.53	VME	2.5	4.45	ME	7.5	4.33	ME	8	4.43	ME	8.5	4.70	VME	4	4.49	ME	6
7. Teachers keep learners focused and engaged.	4.33	ME	9	4.45	ME	7.5	4.33	ME	8	4.45	ME	7	4.73	VME	1	4.46	ME	9

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
8. They encourage learner participation and cooperation.	4.40	ME	6.5	4.53	VME	3.5	4.50	VME	4.5	4.53	VME	3	4.72	VME	2	4.54	VME	3
9. Teachers use strategies to minimize distractions.	4.40	ME	6.5	4.50	VME	5.5	4.50	VME	4.5	4.50	VME	5.5	4.60	VME	6	4.50	VME	5
Average Weighted Mean	**4.45**	**ME**		**4.52**	**VME**		**4.50**	**VME**		**4.51**	**VME**		**4.61**	**VME**		**4.52**	**VME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Instructional Competence

All twelve indicators were rated ME, in descending order: teachers promote active participation in discussions (4.44); they use various teaching strategies for better understanding (4.35); they use technology to enhance instruction (4.34); they adjust teaching methods based on learner needs (4.34); they provide constructive feedback to learners (4.34); teachers explain lessons clearly and simply (4.33); teachers assess understanding through varied activities (4.30); teachers relate lessons to real-life situations (4.28); they integrate collaboration and communication in lessons (4.23); they give learners opportunities for hands-on learning (4.22); teachers inspire learners to think creatively (4.21); and teachers encourage critical thinking and problem-solving (4.20). The average weighted mean was 4.30 (ME) (Table 15).

Table 15. The Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills in terms of Instructional Competence

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Teachers explain lessons clearly and simply.	4.44	ME	11	4.01	ME	10.5	4.51	VME	2	4.08	ME	11	4.63	VME	5	4.33	ME	6

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
2. They use various teaching strategies for better understanding.	4.38	ME	2.5	4.26	ME	5	4.15	ME	9.5	4.38	ME	3	4.60	VME	6	4.35	ME	2
3. Teachers relate lessons to real-life situations.	4.13	ME	8	4.26	ME	5	4.17	ME	6	4.19	ME	6	4.65	VME	4	4.28	ME	8
4. They use technology to enhance instruction.	4.38	ME	2.5	4.01	ME	10.5	4.51	VME	2	4.30	ME	4	4.50	VME	7	4.34	ME	4
5. Teachers encourage critical thinking and problem-solving.	4.00	ME	12	4.01	ME	10.5	4.15	ME	9.5	4.15	ME	12	4.70	VME	1	4.20	ME	12
6. They give learners opportunities for hands-on learning.	4.30	ME	4	4.01	ME	10.5	4.15	ME	9.5	4.15	ME	8.5	4.48	ME	8	4.22	ME	10
7. Teachers assess understanding through varied activities.	4.19	ME	6.5	4.13	ME	8	4.33	ME	4.5	4.15	ME	8.5	4.68	VME	2.5	4.30	ME	7
8. They adjust teaching methods based on learner needs.	4.19	ME	6.5	4.26	ME	5	4.33	ME	4.5	4.26	ME	5	4.68	VME	2.5	4.34	ME	4
9. Teachers promote active participation in discussions.	4.10	ME	10	4.63	VME	1.5	4.51	VME	2	4.53	VME	1	4.45	ME	10	4.44	ME	1
10. They provide constructive feedback to learners.	4.25	ME	5	4.63	VME	1.5	4.15	ME	9.5	4.41	ME	2	4.25	ME	12	4.34	ME	4
11. Teachers inspire learners to think creatively.	4.10	ME	10	4.26	ME	5	4.15	ME	9.5	4.15	ME	8.5	4.40	ME	11	4.21	ME	11
12. They integrate collaboration and communication in lessons.	4.10	ME	10	4.26	ME	5	4.15	ME	9.5	4.15	ME	8.5	4.48	ME	9	4.23	ME	9

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
Average Weighted Mean	**4.21**	**ME**		**4.23**	**ME**		**4.27**	**ME**		**4.23**	**ME**		**4.61**	**VME**		**4.30**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Summary of the teachers' teaching competence

Interpersonal Relationship (4.70) and Classroom Management (4.52) were rated VME, while Instructional Material Development (4.39) and Instructional Competence (4.30) were rated ME (Table 16). The overall average weighted mean was 4.47 (ME).

Table 16. The Summary of the Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Interpersonal Relationship	4.76	VME	1	4.67	VME	1	4.91	VME	1	4.78	VME	1	4.38	ME	4	4.70	VME	1
2. Instructional Material Development	4.36	ME	3	4.52	VME	2.5	4.36	ME	3	4.27	ME	3	4.45	ME	3	4.39	ME	3
3. Classroom Management	4.45	ME	2	4.52	VME	2.5	4.50	VME	2	4.51	VME	2	4.61	VME	1.5	4.52	VME	2
4. Instructional Competence	4.21	ME	4	4.23	ME	4	4.27	ME	4	4.23	ME	4	4.61	VME	1.5	4.30	ME	4
Average Weighted Mean	**4.47**	**ME**		**4.48**	**ME**		**4.50**	**VME**		**4.45**	**ME**		**4.50**	**VME**		**4.47**	**ME**	

Legend: 4.50–5.00 Very Much Evident (VME); 3.50–4.49 Much Evident (ME); 2.50–3.49 Evident (E); 1.50–2.49 Fairly Evident (FE); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

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Volume 1 Issue 4 Pages 112-160

Agreement on the rank orders of the teachers' teaching competence (Question 4)

The sums of squared deviations were 809 (Interpersonal Relationship), 415.5 (Instructional Material Development), 482.5 (Classroom Management), and 706 (Instructional Competence). W and χ^2 were 0.30 and 14.50, 0.20 and 9.00, 0.32 and 12.80, and 0.20 and 11.00, respectively (all $p > 0.05$). The computed χ^2 values did not exceed the tabular values at the 0.05 level; hence, H_o2 was accepted: there is no significant agreement on the rank orders (Table 17).

Table 17. The Test of Significant Agreement on the Rank Orders of the Extent of the Level of the Teachers' Teaching Competence in the Development of the 21st-Century Skills

Indicator	**Interpersonal Relationship**	**Instructional Material Development**	**Classroom Management**	**Instructional Competence**
Summation of the squared deviation from the mean (S)	809	415.5	482.5	706
Number of indicators (N)	11	10	9	12
Coefficient of Concordance (W)	0.30	0.20	0.32	0.20
Computed χ^2	14.50	9.00	12.80	11.00
Degrees of freedom	10	9	8	11
Tabular χ^2 at 0.05	18.31	16.92	15.51	19.68
Tabular χ^2 at 0.025	21.16	19.68	18.17	21.92
Tabular χ^2 at 0.01	23.21	21.67	20.09	24.72
Tabular χ^2 at 0.005	25.19	23.59	21.95	26.76
Tabular χ^2 at 0.001	29.59	27.88	26.12	31.26
Decision on H_o	**Accepted**	**Accepted**	**Accepted**	**Accepted**

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Volume 1 Issue 4 Pages 112-160

Indicator	Interpersonal Relationship	Instructional Material Development	Classroom Management	Instructional Competence
Significance of agreement	**Not significant**	**Not significant**	**Not significant**	**Not significant**

Note. k = 5 groups (congressional districts); $\chi^2 = k(N - 1)W$. Tabular values are not exceeded at $\alpha = 0.05$.

Challenges encountered by the respondents

Limited Resources

All eleven indicators were rated Very Much Challenging (VMC), in descending order: difficulty in preparing quality materials (4.89); shortage of printed learning modules (4.79); insufficient access to technology tools (4.77); budget constraints for innovative teaching (4.75); limited internet connection in school (4.73); inadequate classroom equipment for activities (4.72); lack of visual and manipulative materials (4.70); no access to updated math software (4.69); few projectors or multimedia tools available (4.62); lack of instructional materials for math lessons (4.56); and scarcity of reference books and math aids (4.50). The average weighted mean was 4.70 (VMC) (Table 18).

Table 18. The Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners along Limited Resources

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Lack of instructional materials for math lessons.	4.14	MC	11	4.73	VMC	5.5	5.00	VMC	4.5	4.62	VMC	10	4.33	MC	8	4.56	VMC	10
2. Insufficient access to technology tools.	4.71	VMC	7.5	4.91	VMC	2	5.00	VMC	4.5	4.87	VMC	3	4.38	MC	6	4.77	VMC	3
3. Shortage of printed learning modules.	5.00	VMC	2.5	4.64	VMC	7.5	5.00	VMC	4.5	4.88	VMC	2	4.45	MC	3	4.79	VMC	2
4. Limited internet connection in school.	4.71	VMC	7.5	4.82	VMC	3.5	5.00	VMC	4.5	4.84	VMC	5	4.30	MC	10	4.73	VMC	5
5. Inadequate classroom equipment for activities.	4.57	VMC	10	4.82	VMC	3.5	5.00	VMC	4.5	4.80	VMC	6.5	4.40	MC	5	4.72	VMC	6

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Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
6. Scarcity of reference books and math aids.	4.71	VMC	7.5	4.18	MC	11	4.60	VMC	10.5	4.50	VMC	11	4.50	VMC	1	4.50	VMC	11
7. Lack of visual and manipulative materials.	5.00	VMC	2.5	4.64	VMC	7.5	4.60	VMC	10.5	4.75	VMC	8	4.49	MC	2	4.70	VMC	7
8. Budget constraints for innovative teaching.	5.00	VMC	2.5	4.55	VMC	9	5.00	VMC	4.5	4.85	VMC	4	4.35	MC	7	4.75	VMC	4
9. Difficulty in preparing quality materials.	5.00	VMC	2.5	5.00	VMC	1	5.00	VMC	4.5	5.00	VMC	1	4.43	MC	4	4.89	VMC	1
10. No access to updated math software.	4.86	VMC	5	4.73	VMC	5.5	4.80	VMC	9	4.80	VMC	6.5	4.25	MC	11	4.69	VMC	8
11. Few projectors or multimedia tools available.	4.71	VMC	7.5	4.36	MC	10	5.00	VMC	4.5	4.69	VMC	9	4.32	MC	9	4.62	VMC	9
Average Weighted Mean	**4.76**	**VMC**		**4.67**	**VMC**		**4.91**	**VMC**		**4.78**	**VMC**		**4.38**	**MC**		**4.70**	**VMC**	

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Poor Assessment

"Difficulty in measuring critical thinking" was rated VMC (4.54). Rated Much Challenging (MC) were: insufficient feedback on learner performance (4.47); lack of time for individualized assessment (4.44); inconsistent grading systems (4.44); assessments do not measure 21st-century skills (4.44); teachers struggle to create rubrics (4.37); focus only on written tests (4.35); overemphasis on summative tests (4.33); lack of varied assessment tools (4.31); and limited use of performance-based evaluation (4.24). The average weighted mean was 4.39 (MC) (Table 19).

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www.jasdg.com
Volume 1 Issue 4 Pages 112-160

Table 19. The Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners along Poor Assessment

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Lack of varied assessment tools.	4.61	VMC	2	4.25	MC	8	4.23	MC	8	4.20	MC	8	4.27	MC	8	4.31	MC	9
2. Focus only on written tests.	4.39	MC	3.5	4.25	MC	8	4.20	MC	10	4.55	VMC	1	4.35	MC	6	4.35	MC	7
3. Lack of time for individualized assessment.	4.20	MC	10	4.75	VMC	3	4.25	MC	7	4.35	MC	2	4.65	VMC	3	4.44	MC	4
4. Limited use of performance-based evaluation.	4.39	MC	3.5	4.20	MC	10	4.21	MC	9	4.20	MC	8	4.20	MC	10	4.24	MC	10
5. Inconsistent grading systems.	4.22	MC	8	4.75	VMC	3	4.60	VMC	1.5	4.20	MC	8	4.44	MC	5	4.44	MC	4
6. Insufficient feedback on learner performance.	4.21	MC	9	4.75	VMC	3	4.28	MC	5	4.29	MC	3	4.83	VMC	1	4.47	MC	2
7. Assessments do not measure 21st-century skills.	4.31	MC	6	4.50	VMC	6	4.45	MC	4	4.20	MC	8	4.72	VMC	2	4.44	MC	4
8. Teachers struggle to create rubrics.	4.22	MC	7	4.75	VMC	3	4.26	MC	6	4.28	MC	4	4.34	MC	7	4.37	MC	6
9. Difficulty in measuring critical thinking.	4.67	VMC	1	4.75	VMC	3	4.55	VMC	3	4.27	MC	5	4.48	MC	4	4.54	VMC	1
10. Overemphasis on summative tests.	4.34	MC	5	4.25	MC	8	4.60	VMC	1.5	4.20	MC	8	4.26	MC	9	4.33	MC	8
Average Weighted Mean	**4.36**	**MC**		**4.52**	**VMC**		**4.36**	**MC**		**4.27**	**MC**		**4.45**	**MC**		**4.39**	**MC**	

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

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www.jasdg.com
Volume 1 Issue 4 Pages 112-160

Lack of Administrative Support

Rated VMC were: slow approval of proposed projects (4.63); few training programs offered (4.61); inadequate communication between teachers and heads (4.54); insufficient funds for math innovations (4.52); and absence of technical support in teaching tools (4.50). Rated MC were: minimal monitoring of classroom practices (4.49); lack of incentives for teachers (4.48); limited provision of learning materials (4.47); and lack of encouragement from school leaders (4.46). The average weighted mean was 4.52 (VMC) (Table 20).

Table 20. The Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners along Lack of Administrative Support

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Insufficient funds for math innovations.	4.40	MC	6.5	4.50	VMC	5.5	4.50	VMC	4.5	4.60	VMC	1.5	4.60	VMC	6	4.52	VMC	4
2. Lack of incentives for teachers.	4.40	MC	6.5	4.53	VMC	3.5	4.50	VMC	4.5	4.52	VMC	4	4.45	MC	9	4.48	MC	7
3. Slow approval of proposed projects.	4.53	VMC	2.5	4.63	VMC	1.5	4.67	VMC	2	4.60	VMC	1.5	4.71	VMC	3	4.63	VMC	1
4. Few training programs offered.	4.47	MC	4	4.63	VMC	1.5	4.83	VMC	1	4.50	VMC	5.5	4.60	VMC	6	4.61	VMC	2
5. Limited provision of learning materials.	4.60	VMC	1	4.44	MC	9	4.33	MC	8	4.43	MC	8.5	4.50	VMC	8	4.47	MC	8
6. Minimal monitoring of classroom practices.	4.53	VMC	2.5	4.45	MC	7.5	4.33	MC	8	4.43	MC	8.5	4.70	VMC	4	4.49	MC	6
7. Lack of encouragement from school leaders.	4.33	MC	9	4.45	MC	7.5	4.33	MC	8	4.45	MC	7	4.73	VMC	1	4.46	MC	9
8. Inadequate communication between teachers and heads.	4.40	MC	6.5	4.53	VMC	3.5	4.50	VMC	4.5	4.53	VMC	3	4.72	VMC	2	4.54	VMC	3
9. Absence of technical support in teaching tools.	4.40	MC	6.5	4.50	VMC	5.5	4.50	VMC	4.5	4.50	VMC	5.5	4.60	VMC	6	4.50	VMC	5
Average Weighted Mean	**4.45**	**MC**		**4.52**	**VMC**		**4.50**	**VMC**		**4.51**	**VMC**		**4.61**	**VMC**		**4.52**	**VMC**	

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www.jasdg.com
Volume 1 Issue 4 Pages 112-160

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Minimal Learners' Engagement

All twelve indicators were rated MC, in descending order: limited interaction in online learning (4.44); learners show low participation in activities (4.35); lessons are sometimes too difficult to follow (4.34); poor attendance during class sessions (4.34); learners are shy to ask questions (4.34); learners lose focus during math discussions (4.33); learners are distracted by gadgets (4.30); some learners fear making mistakes (4.28); learners struggle to apply concepts (4.23); lack of motivation to solve problems (4.22); activities lack excitement and fun (4.21); and learners rely too much on groupmates (4.20). The average weighted mean was 4.30 (MC) (Table 21).

Table 21. The Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners along Minimal Learners' Engagement

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Learners lose focus during math discussions.	4.44	MC	11	4.01	MC	10.5	4.51	VMC	2	4.08	MC	11	4.63	VMC	5	4.33	MC	6
2. Learners show low participation in activities.	4.38	MC	2.5	4.26	MC	5	4.15	MC	9.5	4.38	MC	3	4.60	VMC	6	4.35	MC	2
3. Some learners fear making mistakes.	4.13	MC	8	4.26	MC	5	4.17	MC	6	4.19	MC	6	4.65	VMC	4	4.28	MC	8
4. Lessons are sometimes too difficult to follow.	4.38	MC	2.5	4.01	MC	10.5	4.51	VMC	2	4.30	MC	4	4.50	VMC	7	4.34	MC	4
5. Learners rely too much on groupmates.	4.00	MC	12	4.01	MC	10.5	4.15	MC	9.5	4.15	MC	12	4.70	VMC	1	4.20	MC	12
6. Lack of motivation to solve problems.	4.30	MC	4	4.01	MC	10.5	4.15	MC	9.5	4.15	MC	8.5	4.48	MC	8	4.22	MC	10
7. Learners are distracted by gadgets.	4.19	MC	6.5	4.13	MC	8	4.33	MC	4.5	4.15	MC	8.5	4.68	VMC	2.5	4.30	MC	7
8. Poor attendance during class sessions.	4.19	MC	6.5	4.26	MC	5	4.33	MC	4.5	4.26	MC	5	4.68	VMC	2.5	4.34	MC	4

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www.jasdg.com
Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
9. Limited interaction in online learning.	4.10	MC	10	4.63	VMC	1.5	4.51	VMC	2	4.53	VMC	1	4.45	MC	10	4.44	MC	1
10. Learners are shy to ask questions.	4.25	MC	5	4.63	VMC	1.5	4.15	MC	9.5	4.41	MC	2	4.25	MC	12	4.34	MC	4
11. Activities lack excitement and fun.	4.10	MC	10	4.26	MC	5	4.15	MC	9.5	4.15	MC	8.5	4.40	MC	11	4.21	MC	11
12. Learners struggle to apply concepts.	4.10	MC	10	4.26	MC	5	4.15	MC	9.5	4.15	MC	8.5	4.48	MC	9	4.23	MC	9
Average Weighted Mean	**4.21**	**MC**		**4.23**	**MC**		**4.27**	**MC**		**4.23**	**MC**		**4.61**	**VMC**		**4.30**	**MC**	

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Low Technology Confidence

Rated VMC were: difficulty in operating new educational software (4.51) and learners are not tech-savvy in math applications (4.50). Rated MC were: limited training on digital teaching platforms (4.49); difficulty in integrating technology with lessons (4.48); some resist using new learning platforms (4.47); unstable internet affects technology use (4.42); teachers lack confidence in online teaching (4.41); teachers are not fully skilled in using ICT tools (4.40); and fear of making technical mistakes (4.37). The average weighted mean was 4.45 (MC) (Table 22).

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Volume 1 Issue 4 Pages 112-160

Table 22. The Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners with Low Technology Confidence

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Teachers are not fully skilled in using ICT tools.	4.67	VMC	1	4.40	MC	8	4.33	MC	7	4.40	MC	7	4.37	MC	9	4.40	MC	8
2. Difficulty in operating new educational software.	4.60	VMC	3.5	4.51	VMC	1	4.33	MC	7	4.50	VMC	2	4.40	MC	8	4.51	VMC	1
3. Limited training on digital teaching platforms.	4.60	VMC	3.5	4.49	MC	3	4.67	VMC	2	4.49	MC	3.5	4.49	MC	3	4.49	MC	3
4. Fear of making technical mistakes.	4.47	MC	8.5	4.37	MC	9	4.33	MC	7	4.36	MC	9	4.51	VMC	1	4.37	MC	9
5. Unstable internet affects technology use.	4.53	VMC	6.5	4.42	MC	6	4.33	MC	7	4.40	MC	7	4.42	MC	6	4.42	MC	6
6. Teachers lack confidence in online teaching.	4.60	VMC	3.5	4.41	MC	7	4.33	MC	7	4.40	MC	7	4.41	MC	7	4.41	MC	7
7. Difficulty in integrating technology with lessons.	4.47	MC	8.5	4.48	MC	4	4.67	VMC	2	4.49	MC	3.5	4.48	MC	4	4.48	MC	4
8. Learners are not tech-savvy in math applications.	4.53	VMC	6.5	4.50	VMC	2	4.67	VMC	2	4.51	VMC	1	4.50	VMC	2	4.50	VMC	2
9. Some resist using new learning platforms.	4.60	VMC	3.5	4.47	MC	5	4.50	VMC	4	4.48	MC	5	4.47	MC	5	4.47	MC	5
Average Weighted Mean	**4.56**	**VMC**		**4.45**	**MC**		**4.46**	**MC**		**4.45**	**MC**		**4.45**	**MC**		**4.45**	**MC**	

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Summary of the challenges encountered

Limited Resources (4.70) and Lack of Administrative Support (4.52) were rated VMC, while Low Technology Confidence (4.45), Poor Assessment (4.39), and Minimal Learners' Engagement (4.30) were rated MC (Table 23). The overall average weighted mean was 4.47 (MC).

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Volume 1 Issue 4 Pages 112-160

Table 23. The Summary of the Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Limited Resources	4.76	VMC	1	4.67	VMC	1	4.91	VMC	1	4.78	VMC	1	4.38	MC	5	4.70	VMC	1
2. Poor Assessment	4.36	MC	4	4.52	VMC	2.5	4.36	MC	4	4.27	MC	4	4.45	MC	3.5	4.39	MC	4
3. Lack of Administrative Support	4.45	MC	3	4.52	VMC	2.5	4.50	VMC	2	4.51	VMC	2	4.61	VMC	1.5	4.52	VMC	2
4. Minimal Learners' Engagement	4.21	MC	5	4.23	MC	5	4.27	MC	5	4.23	MC	5	4.61	VMC	1.5	4.30	MC	5
5. Low Technology Confidence	4.56	VMC	2	4.45	MC	4	4.46	MC	3	4.45	MC	3	4.45	MC	3.5	4.45	MC	3
Average Weighted Mean	**4.47**	**MC**		**4.48**	**MC**		**4.50**	**VMC**		**4.45**	**MC**		**4.50**	**VMC**		**4.47**	**MC**	

Legend: 4.50–5.00 Very Much Challenging (VMC); 3.50–4.49 Much Challenging (MC); 2.50–3.49 Challenging (C); 1.50–2.49 Fairly Challenging (FC); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Solutions offered to address the challenges

The twelve solutions were rated Much Appropriate (MA) by scale, in descending order: provide teachers with sufficient instructional resources (4.44); strengthen ICT infrastructure and internet access (4.35); develop authentic, performance-based assessments (4.34); organize regular learning action cell (LAC) sessions (4.34); introduce gamified math lessons for better engagement (4.34); allocate school funds for teaching innovations (4.33); improve communication between teachers and administrators (4.30); conduct regular training on assessment design (4.28); integrate technology gradually into math instruction (4.23); offer incentives for creative teaching practices (4.22); promote collaboration among teachers to share best practices (4.21); and encourage learner-centered and activity-based learning (4.20). The average weighted mean was 4.30 (MA) (Table 24).

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Volume 1 Issue 4 Pages 112-160

Table 24. The Solutions Offered to Address the Challenges Encountered by the Respondents in Developing the 21st-Century Skills in Mathematics of the Senior High School Learners

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
1. Allocate school funds for teaching innovations.	4.44	MA	11	4.01	MA	10.5	4.51	VMA	2	4.08	MA	11	4.63	VMA	5	4.33	MA	6
2. Strengthen ICT infrastructure and internet access.	4.38	MA	2.5	4.26	MA	5	4.15	MA	9.5	4.38	MA	3	4.60	VMA	6	4.35	MA	2
3. Conduct regular training on assessment design.	4.13	MA	8	4.26	MA	5	4.17	MA	6	4.19	MA	6	4.65	VMA	4	4.28	MA	8
4. Develop authentic, performance-based assessments.	4.38	MA	2.5	4.01	MA	10.5	4.51	VMA	2	4.30	MA	4	4.50	VMA	7	4.34	MA	4
5. Encourage learner-centered and activity-based learning.	4.00	MA	12	4.01	MA	10.5	4.15	MA	9.5	4.15	MA	12	4.70	VMA	1	4.20	MA	12
6. Offer incentives for creative teaching practices.	4.30	MA	4	4.01	MA	10.5	4.15	MA	9.5	4.15	MA	8.5	4.48	MA	8	4.22	MA	10
7. Improve communication between teachers and administrators.	4.19	MA	6.5	4.13	MA	8	4.33	MA	4.5	4.15	MA	8.5	4.68	VMA	2.5	4.30	MA	7
8. Organize regular learning action cell (LAC) sessions.	4.19	MA	6.5	4.26	MA	5	4.33	MA	4.5	4.26	MA	5	4.68	VMA	2.5	4.34	MA	4
9. Provide teachers with sufficient instructional resources.	4.10	MA	10	4.63	VMA	1.5	4.51	VMA	2	4.53	VMA	1	4.45	MA	10	4.44	MA	1

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www.jasdg.com
Volume 1 Issue 4 Pages 112-160

Indicators	1st Congressional District			2nd Congressional District			3rd Congressional District			4th Congressional District			5th Congressional District			Average		
	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R	Wx	Int	R
10. Introduce gamified math lessons for better engagement.	4.25	MA	5	4.63	VMA	1.5	4.15	MA	9.5	4.41	MA	2	4.25	MA	12	4.34	MA	4
11. Promote collaboration among teachers to share best practices.	4.10	MA	10	4.26	MA	5	4.15	MA	9.5	4.15	MA	8.5	4.40	MA	11	4.21	MA	11
12. Integrate technology gradually into math instruction.	4.10	MA	10	4.26	MA	5	4.15	MA	9.5	4.15	MA	8.5	4.48	MA	9	4.23	MA	9
Average Weighted Mean	**4.21**	**MA**		**4.23**	**MA**		**4.27**	**MA**		**4.23**	**MA**		**4.61**	**VMA**		**4.30**	**MA**	

Legend: 4.50–5.00 Very Much Appropriate (VMA); 3.50–4.49 Much Appropriate (MA); 2.50–3.49 Appropriate (A); 1.50–2.49 Fairly Appropriate (FA); 1.00–1.49 Not At All (NA). Wx = weighted mean; Int = interpretation; R = rank.

Agreement on the rank orders of the challenges encountered and the solutions offered (Question 7)

The sums of squared deviations were 809 (Limited Resources), 415.5 (Poor Assessment), 482.5 (Lack of Administrative Support), 706 (Minimal Learners' Engagement), 497.5 (Low Technology Confidence), and 706 (Solutions Offered). W and χ^2 were 0.30 and 14.50, 0.20 and 9.00, 0.32 and 12.80, 0.20 and 11.00, 0.33 and 13.20, and 0.20 and 11.00, respectively (all $p > 0.05$). The computed χ^2 values did not exceed the tabular values at the 0.05 level; hence, $H_0 3$ was accepted: there is no significant agreement on the rank orders (Table 25).

Table 25. The Test of Significant Agreement on the Rank Orders of the Challenges Encountered and the Solutions Offered by the Respondents

Indicator	Limited Resources	Poor Assessment	Lack of Administrative Support	Minimal Learners' Engagement	Low Technology Confidence	Solutions Offered
Summation of the squared deviation from the mean (S)	809	415.5	482.5	706	497.5	706

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Volume 1 Issue 4 Pages 112-160

Indicator	Limited Resources	Poor Assessment	Lack of Administrative Support	Minimal Learners' Engagement	Low Technology Confidence	Solutions Offered
Number of indicators (N)	11	10	9	12	9	12
Coefficient of Concordance (W)	0.30	0.20	0.32	0.20	0.33	0.20
Computed χ^2	14.50	9.00	12.80	11.00	13.20	11.00
Degrees of freedom	10	9	8	11	8	11
Tabular χ^2 at 0.05	18.31	16.92	15.51	19.68	15.51	19.68
Tabular χ^2 at 0.025	21.16	19.68	18.17	21.92	18.17	21.92
Tabular χ^2 at 0.01	23.21	21.67	20.09	24.72	20.09	24.72
Tabular χ^2 at 0.005	25.19	23.59	21.95	26.76	21.95	26.76
Tabular χ^2 at 0.001	29.59	27.88	26.12	31.26	26.12	31.26
Decision on H_0	**Accepted**	**Accepted**	**Accepted**	**Accepted**	**Accepted**	**Accepted**
Significance of agreement	**Not significant**	**Not significant**	**Not significant**	**Not significant**	**Not significant**	**Not significant**

Note. k = 5 groups (congressional districts); $\chi^2 = k(N - 1)W$. Tabular values are not exceeded at $\alpha = 0.05$.

Training design crafted from the findings (Question 8)

A training design, "Enhancing 21st-Century Skills in Senior High School Mathematics: A Teacher Training Initiative in Public Secondary Schools of the Division of Camarines Sur," was crafted based on the findings. Its modules target the lowest-ranked indicators of learner skills and teaching competence and the highest-ranked challenges and solutions (Table 26). The complete training design is presented in Appendix B.

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Volume 1 Issue 4 Pages 112-160

Table 26. Training Modules Derived from the Findings

Dimension	Indicator addressed (weighted mean)	Training module
A. Lowest-ranked indicators of the 21st-century skills of the learners		
Competence	Learners can connect math to real-life situations (4.50)	Contextualized and Applied Mathematics Instruction
Compassion	They respect the learning pace of their classmates (4.24)	Differentiated Instruction and Compassionate Classroom Management
Communication	They can defend their answers with evidence (4.46)	Mathematical Reasoning and Justification-Oriented Instruction
Collaboration	Learners value teamwork in reaching solutions (4.20); lowest-ranked skill overall (4.30)	Collaborative Problem-Solving and Teamwork Enhancement
Character	They show perseverance in solving hard problems (4.37)	Resilience and Growth Mindset in Mathematics
B. Lowest-ranked indicators of the teachers' teaching competence		
Interpersonal Relationship	They maintain harmonious relationships with colleagues (4.50)	Professional Collaboration and Relationship-Building
Instructional Material Development	Teachers use multimedia presentations effectively (4.24)	Multimedia Integration and Digital Instruction
Classroom Management	Teachers ensure safety and comfort for all learners (4.47)	Safe and Supportive Learning Environment
Instructional Competence	Teachers encourage critical thinking and problem-solving (4.20); lowest-ranked dimension overall (4.30)	Critical Thinking and Problem-Solving Strategies in Mathematics; Learner-Centered and Inquiry-Based Instruction
C. Highest-ranked challenges and solutions		

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Volume 1 Issue 4 Pages 112-160

Dimension	Indicator addressed (weighted mean)	Training module
Limited Resources	Difficulty in preparing quality materials (4.89); highest-ranked challenge overall (4.70)	Instructional Materials Design and Innovation; Resourceful Teaching and Materials Innovation
Poor Assessment	Difficulty in measuring critical thinking (4.54)	Critical Thinking Assessment Strategies
Lack of Administrative Support	Slow approval of proposed projects (4.63)	Project Proposal and Administrative Coordination
Minimal Learners' Engagement	Limited interaction in online learning (4.44)	Active Online Engagement Strategies
Low Technology Confidence	Difficulty in operating new educational software (4.51)	Technology Integration and Software Proficiency
Solutions offered	Provide teachers with sufficient instructional resources (4.44)	Resource Management and Instructional Material Utilization

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Volume 1 Issue 4 Pages 97-111

DISCUSSION

This section interprets the findings for each set of indicators: the highest- and lowest-ranked indicators, the implication for the training design, and the relation to the literature in Section 1.2. Because the respondents were teachers, the ratings of learner skills reflect teachers' perceptions.

Development of the 21st-century skills of the SHS learners in Mathematics

Competence (4.70, VME). "Learners understand basic mathematical concepts" (4.89) ranked highest, implying that instruction strongly reinforces fundamental skills through worksheets, quizzes, and assessments aligned with the K–12 curriculum, which builds procedural fluency when concepts are presented in well-organized, recognizable formats. "Learners can connect math to real-life situations" (4.50) ranked lowest, although still VME: real-world applications are not regularly incorporated, and instruction may concentrate on formula-driven solutions, leaving a disconnect between theoretical understanding and application. *Implication:* a module on **Contextualized and Applied Mathematics Instruction** with real-life performance tasks, inquiry-based methods, local examples, and co-created task cards and lesson plans. This is consistent with Niss (2022), who grounds mathematics education in "mathematical competency," with Juadinez (2020), who attributed low performance to weak mastery of basic skills, and with Madrugar (2020), who concluded that learning mathematics requires connections to prior and real-life experiences.

Compassion (4.39, ME). "Learners show care to classmates who need help" (4.54) ranked highest, reflecting peer solidarity and cultural values such as *bayanihan*. "They respect the learning pace of their classmates" (4.24) ranked lowest: the fast pace of instruction, academic pressure, and differences in ability may lead learners to become impatient with slower classmates. *Implication:* a module on **Differentiated Instruction and Compassionate Classroom Management** (flexible grouping, tiered tasks, peer-assisted learning, group norms, growth-mindset activities), in line with Juadinez (2020) on flexible, resourceful teaching and Rivera (2022) on fostering belonging.

Communication (4.52, VME). "Learners listen carefully to the teacher's instructions" (4.63) ranked highest, reflecting familiarity with teacher-led instruction and respect for teacher authority. "They can defend their answers with evidence" (4.46) ranked lowest: traditional instruction emphasizes procedural accuracy over reasoning, so learners give answers but not explanations. *Implication:* a module on **Mathematical Reasoning and Justification-Oriented Instruction** (math journaling, explain-your-answer exercises, Think-Pair-Share, error analysis, solution presentations), responding to the limits that Juadinez (2020) found in teaching strategies and performance-based activities.

Collaboration (4.30, ME). "Learners build trust within their math teams" (4.44) ranked highest, while "Learners value teamwork in reaching solutions" (4.20) ranked lowest, showing a gap between social comfort and productive teamwork; learners may still prioritize individual performance, with little experience in structured cooperative problem-solving. Collaboration was also the lowest-ranked skill overall. *Implication:* a module on **Collaborative Problem-Solving and Teamwork Enhancement** (interdependent tasks, jigsaw, peer feedback, teamwork rubrics, group accountability, conflict resolution); Madrugar's (2020) findings show that benefits depend on well-structured activities.

Character (4.45, ME). "They value discipline in submitting outputs on time" (4.51) ranked highest, reinforced by the cultural emphasis on punctuality and responsibility. "They show perseverance in solving hard problems" (4.37) ranked lowest: instruction emphasizes correct answers over the process of tackling challenging tasks, leaving a gap in resilience and persistence. *Implication:* a module on **Resilience and Growth Mindset in Mathematics** (difficult but doable tasks, scaffolded problem-solving, effort-focused feedback, errors treated as learning opportunities), consistent with Madrugar's (2020) observation that learners need time and productive struggle to make mathematics meaningful.

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Volume 1 Issue 4 Pages 97-111

Overall (4.47, ME). Competence ranked first and Collaboration last. Learners are strongest in individual, procedural competence and weakest in collaboration and in compassion toward peers of different pace, which suggests that classroom practice has not yet fully shifted toward the interactive, learner-centered approaches associated with 21st-century skills (Juadinez, 2020; Niss, 2022).

Teachers' teaching competence in the development of the 21st-century skills

Interpersonal Relationship (4.70, VME). "Teachers use positive reinforcement effectively" (4.89) ranked highest, creating a safe, encouraging environment that fosters engagement. "They maintain harmonious relationships with colleagues" (4.50) ranked lowest: teachers excel in learner interactions but may struggle with teamwork and regular communication with coworkers because of workload and limited team-based planning. *Implication:* a module on **Professional Collaboration and Relationship-Building** (communication and dispute resolution, peer mentoring, co-teaching), in line with Cruz (2020) on combining subject expertise with interpersonal skills and with the Collaborative Expertise emphasis of DepEd Order No. 14, s. 2023.

Instructional Material Development (4.39, ME). "They adapt materials based on learners' skill levels" (4.54) ranked highest, showing awareness of learner diversity. "Teachers use multimedia presentations effectively" (4.24) ranked lowest, owing to limited access to technology, inadequate training, or lack of experience with educational software. *Implication:* a module on **Multimedia Integration and Digital Instruction** (hands-on production of simulations, videos, and presentations). Mendoza (2023) found that commitment and innovative approaches allow teachers to integrate digital tools, and Valdez (2023) found that targeted training is scarce.

Classroom Management (4.52, VME). "Teachers handle misbehavior fairly and consistently" (4.63) ranked highest, creating a predictable environment that frees learners to concentrate on academic engagement. "Teachers ensure safety and comfort for all learners" (4.47) ranked lowest, suggesting that learners' physical and emotional needs are not always fully met because of big classes, limited resources, or inadequate preparation in inclusive methods. *Implication:* a module on a **Safe and Supportive Learning Environment** (inclusive methods, emotional support, clear norms, restorative conflict resolution), in line with Palisoc (2020) and Arrieta (2021) on learner readiness and guidance.

Instructional Competence (4.30, ME). "Teachers promote active participation in discussions" (4.44) ranked highest, while "Teachers encourage critical thinking and problem-solving" (4.20) ranked lowest: instruction still favors teacher-led, procedural practice over inquiry-based, higher-order thinking. *Implication:* a module on **Critical Thinking and Problem-Solving Strategies in Mathematics** (inquiry-based learning, open-ended questions, case studies, peer coaching), consistent with Juadinez (2020).

Overall (4.47, ME). Interpersonal Relationship ranked first and Instructional Competence last, so a **Learner-Centered and Inquiry-Based Instruction** module is proposed, with peer observations, group lesson planning, and reflection sessions; Garcia (2020) shows the value of partnerships such as those with LGUs in sustaining such efforts.

Challenges in developing the 21st-century skills in Mathematics

The challenges are of the kind documented for Philippine school leaders and teachers: resource constraints, administrative demands, and the need for professional development (Lopez, 2021; Articulo, 2023; Espinas, 2021; Santos, 2023).

Limited Resources (4.70, VMC). "Difficulty in preparing quality materials" (4.89) ranked highest, since mathematics calls for visual aids, manipulatives, and contextualized examples that teachers lack the time, expertise, and support to produce; "Scarcity of reference books and math aids" (4.50) ranked lowest, suggesting that scarcity can be lessened through digital, peer-shared, or local resources. *Module:* **Instructional Materials Design and Innovation**. Juadinez (2020) and Santos (2021) similarly noted limited tools and institutional support.

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Volume 1 Issue 4 Pages 97-111

Poor Assessment (4.39, MC). "Difficulty in measuring critical thinking" (4.54) ranked highest, because evaluating complex analysis and problem-solving requires performance tasks and open-ended questions; "Limited use of performance-based evaluation" (4.24) ranked lowest. *Module:* **Critical Thinking Assessment Strategies** (open-ended problems, rubrics, peer-reviewed test construction). Valdez (2023) identified a similar training gap.

Lack of Administrative Support (4.52, VMC). "Slow approval of proposed projects" (4.63) ranked highest, as lengthy approvals may cause initiatives to lose momentum; "Lack of encouragement from school leaders" (4.46) ranked lowest, indicating that administrators typically provide some support despite procedural obstacles. *Module:* **Project Proposal and Administrative Coordination**. This agrees with the leadership literature on administrative responsibilities and resource constraints (Articulo, 2023; Robinson, 2023) and on supportive leadership (Hallinger & Murphy, 2020).

Minimal Learners' Engagement (4.30, MC). "Limited interaction in online learning" (4.44) ranked highest, because online or blended settings limit participation and peer interaction; "Learners rely too much on groupmates" (4.20) ranked lowest, suggesting that engagement is affected more by structural and technological aspects of remote learning than by group dynamics. *Module:* **Active Online Engagement Strategies** (discussion boards, polls, breakout rooms, collaborative whiteboards, gamified demonstrations). Well-designed online practices can sustain performance (Gonda, 2020; Graham, 2020), and relevant, learner-centered lessons raise engagement (Reyes, 2023; Rivera, 2022).

Low Technology Confidence (4.45, MC). "Difficulty in operating new educational software" (4.51) ranked highest, owing to inadequate training or practice time; "Fear of making technical mistakes" (4.37) ranked lowest, suggesting that teachers are open to experimenting and that learning new skills, not fear of failure, is the main obstacle. *Module:* **Technology Integration and Software Proficiency** (guided tutorials, practice on learning management systems and virtual manipulatives, peer mentoring). Asiyai (2019) and Caluza and Verecio (2022) likewise found low ICT competence and recommended training.

Overall (4.47, MC). Limited Resources ranked first and Minimal Learners' Engagement last: engagement problems are frequently situational rather than systemic, since learners typically respond favorably when instruction is well planned. A **Resourceful Teaching and Materials Innovation** module is therefore proposed (repurposed objects as manipulatives, open-access digital resources, school-wide resource banks), consistent with Thompson (2021) and the Department of Education (2020) on supporting learners amid changing conditions.

Solutions offered to address the challenges

The solutions offered (4.30, Much Appropriate overall) include innovative instructional strategies, technology integration, targeted professional development, differentiated instruction, and a collaborative learning environment. "Provide teachers with sufficient instructional resources" (4.44) ranked highest because teachers believe resource availability directly affects engagement and instructional quality; "Encourage learner-centered and activity-based learning" (4.20) ranked lowest, as class size, curriculum requirements, and current methods constrain it, and teachers regard resource support as the first step. The highest-ranked solution is operationalized in a **Resource Management and Instructional Material Utilization** module. The emphasis on resources, professional development, and collaboration is in line with Valdez (2023) and Mckay (2020).

Agreement on the rank orders

Because the computed χ^2 values did not exceed the tabular values at the 0.05 level for any set of indicators ($W = 0.20–0.33$), there is no significant agreement among the five districts on how the indicators, challenges, and solutions rank. Possible reasons, which were not tested because respondent profiles were not collected, include differences in (1) teaching experience, (2) educational background and training, (3) class size and learner diversity, (4) access to resources and technology, and (5) teaching philosophies and values, all of which may shape how teachers perceive learner skills, teaching competence, problems, and solutions.

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Volume 1 Issue 4 Pages 97-111

Limitations

The study relied on a researcher-made questionnaire answered by SHS teachers; learner skills were therefore assessed through teachers' perceptions rather than direct measures of performance. The respondents were limited to SHS teachers in the Division of Camarines Sur, so the findings may not generalize to other divisions or to private schools. Kendall's W tests agreement among the districts on rank orders and does not indicate the level of the ratings. The explanations of non-agreement are interpretive.

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE RESEARCH

Conclusions

1. The development of the 21st-century skills of the SHS learners in Mathematics is Much Evident overall (4.47), with Competence (4.70) and Communication (4.52) Very Much Evident.
2. The teachers' teaching competence in the development of these skills is Much Evident overall (4.47), with Interpersonal Relationship (4.70) and Classroom Management (4.52) Very Much Evident.
3. The challenges are Much Challenging overall (4.47), with Limited Resources (4.70) and Lack of Administrative Support (4.52) Very Much Challenging; the solutions offered are Much Appropriate (4.30).
4. There is no significant agreement on the rank orders of the skills, the teachers' teaching competence, or the challenges and solutions among the groups of respondents.
5. A training design is crafted based on the findings of the study.

Recommendations

1. The School Division Supervisors and Public Schools District Supervisors should continue monitoring and periodically assessing programs that promote the 21st-century skills in Mathematics to identify areas needing focused improvement.
2. The School Heads should encourage professional development workshops, and the Teachers should share best practices and collaborate to address inconsistencies in teaching approaches.
3. The Local Government Units (LGUs) should allocate resources and technological support to schools to help address the challenges.
4. The Parents and Learners should support home-based learning and participate in learner-centered, collaborative activities to reinforce the solutions.
5. The training design crafted from the findings of the study should be implemented.

Recommendations for future research

1. Replication of this study in another division to verify its validity, including collection of respondent profiles to test the explanations of non-agreement.
2. An experiment on the most effective techniques to manage the challenges encountered in developing the 21st-century skills in Mathematics of SHS learners, and an examination of the relationship between teachers' professional development programs and these skills.
3. Studies on the leadership styles of school heads (including comparison of public and private schools and a longitudinal view) and their influence on the development of the 21st-century skills of SHS learners.

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4. A case study of teachers' strategies in improving the well-being of SNED learners, and the extent of implementation of the K to 12 perspective and programs.

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