



21st Century Teaching Pedagogy and Teaching Efficacy of High School Mathematics Teachers

Margie A. Nacion

Department of Graduate Studies
Naga College Foundation, Inc., Naga City, Philippines

Abstract : This study determined the influence of the level of teachers' 21st century teaching pedagogy and teaching efficacy of high school Mathematics teachers in Calabanga District, Division of Camarines Sur, School Year 2023-2024. The study used a descriptive-correlational design involving 34 respondents. Data Gathering tools included survey questionnaires and validation checklist. Statistical tools utilized were Weighted Mean, Pearson Product Moment Correlation of Coefficient and Coefficient of Determination.

The following conclusions were derived: (1) the level of 21st century teaching pedagogy were highly observed; (2) the level of teaching efficacy of the high school mathematics teachers were very highly efficient; (3) the relationship of 21st century teaching pedagogy with teaching pedagogy along collaboration and creativity were significant; critical thinking, communication, character, and cross-cultural understanding were significant with classroom management; (4) creativity and communication had weak to moderate influence in classroom management while cross-cultural understanding had a moderate influence on technology integration; and (5) A training program was proposed to support Calabanga District high school mathematics teachers to improve their level of 21st century teaching pedagogy and teaching efficacy to be responsive to the call of the needs in education.

Key Words – 21st Century Teaching Pedagogy, Teaching Efficacy, High School Mathematics Teachers, Training Program

I. INTRODUCTION

Mathematics plays a predominant role in everyday life. It serves as essential component towards acquiring skills in many aspects now that the world is increasingly reliant on technology. Mathematics has become more important than ever before; it became a critical tool in many industries and in the modern world and it implies that the significance of mathematics in the curriculum should never be ignored. It is being used in engineering, science, commerce, medicine, finance and in many other fields. Thus, Mathematics helps understand the world and create decisions based on data.

The effectiveness of math teachers has a significant impact on students' involvement, success, and conceptual comprehension. Beyond simple figuring out equations, effective instruction in mathematics emphasizes on developing students' ability to solve problems, utilize logical reasoning, and have a positive outlook on learning. Effective teaching techniques, technology, and student-centered learning are all combined by a proficient math instructor. Teachers can improve student proficiency and appreciation of mathematics by encouraging engagement, confidence, and real-world connections.

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. Education liberates the intellect, unlocks the imagination and is fundamental for self-respect. It is the key to prosperity and opens a world of opportunities, making it possible for each of us to contribute to a progressive, healthy society. Learning benefits every human being and should be available to all. Along SDG 4 on quality education, ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. It ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy. Ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. (United Nations Development Programme, 2024).

The Department of Education (DepEd) Order no. 42, s. 2017 mandates the nationwide adoption and implementation of the Philippine Professional Standards for Teachers (PPST). This set of standards serves as an official guide outlining the essential knowledge, values, and skills required for effective teaching practice. The PPST aims to ensure that teachers meet the professional benchmarks necessary for delivering quality education. In line with the new professional standards for teachers, the Department of Education (DepEd), through the Teacher Education Council (TEC), issues this DepEd Order entitled National Adoption and Implementation of the Philippine Professional Standards for Teachers (PPST). It states, that:

The DepEd recognizes the importance of professional standards in the continuing professional development and advancement of teachers based on the principle of lifelong learning. It is committed to supporting teachers, and taking cognizance of unequivocal evidence that good teachers are vital to raising student achievement. Quality learning is contingent upon quality teaching. Hence, enhancing teacher quality becomes of utmost importance for long term and sustainable nation building.

The quality of education depends upon the quality of teachers and school administrators in school. In the Philippines, educational system face problems of poor quality education. The mass implementation of the K-12 which seeks to answer problems of the country's overcrowded and cluttered curriculum caused more teachers to be challenged to keep abreast with the changing times and to continuously equip themselves with professional qualities and procedures essential for effective classroom instruction. Teaching efficiency is an important variable to promote positive teaching behaviors and student outcomes.

The goal of 21st-century teaching pedagogy is to help teachers and students acquire the abilities needed in a society that is changing quickly due to technology. Critical thinking, creativity, teamwork, and digital literacy replace traditional rote memorizing. The 21st-century pedagogy makes education a dynamic, student-centered, and future-ready experience. This method guarantees that learning is student-centered, interesting, and pertinent to real-world problems. It equips teachers and students to thrive in a world that is constantly changing by using technology, encouraging creativity, and placing a strong emphasis on practical problem-solving.

REVIEW OF RELATED STUDIES AND LITERATURE

21st Century Teaching Pedagogy

The study conducted by Shafiee and Ghani (2022) clearly illustrated that teacher efficacy has an impact on 21st century pedagogical practice. Therefore, teachers need to enhance personal qualities by adding knowledge and skills that are relevant to the needs of the current curriculum. This study also found that teacher efficacy in classroom management and student involvement does not influence 21st century pedagogy. Teachers thus need to be more flexible in teaching sessions, not be too rigid, and serve as facilitators in the T&L process. Teachers need to be optimistic by believing in students' abilities and encouraging more meaningful inquiry-based learning. In addition, this study found that teachers' 21st century pedagogical practice differs based on school category.

In a local note, Dominado (2020) unveiled that there is a highly significant relationship between 21st-century skills and technology skills of the teacher respondents. Based on the discoveries, it is recommended that teachers must use technology efficiently for the welfare of students, teachers, and society, improving the effectiveness of the 21st-century capabilities of educators and systems must contain responsibility for both events and require close attention to a couple of measures. To assist teachers' technology competencies to develop to a high level, administrators ought to provide education incorporating modalities that are relevant to the times.

Moreover, Leonard (2016) posted the 4Cs for 21st-Century talents inside the classroom. The 4Cs indexed are communication, collaboration, vital thinking, and creativity. All four of these items are essential in the 21st-Century classroom. These might be the 4Cs for any century classroom as all these skills are timeless and quite valued, not handiest in the study room but in all professions.

Additionally, Fibriasari (2019) stated that communication is sharing thoughts, questions, ideas, and solutions. In the technological age, it is much easier and, at the same time, more difficult to communicate. Technology has supplied more convenient methods to communicate, but now and again the numerous ways can turn out to be overwhelming. Collaboration is about running together to reach a purpose and placing talent, expertise, and smarts to work. Just like with communication, the Era has made collaboration easier.

Likewise, it is confirmed by Parvin and Salam (2015) who asserted that in the case of 21st-century education, it is rare to find any classes, especially language classes, which do not involve the utilization of any form of technology. Teachers of any field of teaching should, therefore, involve the use of technology in their teaching. For them, technology plays a crucial role in 21st-century education. Accordingly, all educators should familiarize themselves with the technology to strengthen their proficiency. They further affirmed that all teachers should be able to adapt themselves to the technology development and to utilize and manipulate the provided facilities; teaching aids, apps, and others to promote the teaching and learning process.

In a similar track, Zamora and Zamora (2022) probed the 21st century teaching skills and teaching standards competence level of the CTE graduates of Mindoro State College of Agriculture and Technology (MinSCAT) who graduated in the years 2016, 2017 and 2018. The results showed that the teachers' skills and competence are high to a very high extent. Specifically, the graduates received high ratings on their communication skills, life and career skills, and personal growth and professional development. The teachers showed remarkable performances in the light of these indicators. One-way ANOVA revealed that there are significant differences in the level of the graduates' 21st century teaching skills and teaching standards competence level in terms of specific indicators.

Moreover, Simon (2018) stated the habit of teaching to understand the concepts should be cultivated since primary school. By the time the students be in high school or even college, they would be used to understand the logic behind mathematical concepts, which could yield an ability to apply those concepts into both mathematical and real-life problems.

Likewise, Toro (2019), studied the 21st Century Learning Skills in Education and Employability in schools. The data revealed that the school was faithfully implementing the teaching of 21st-century skills, utilizing some 21st-century learning environments, developing a 21st-century curriculum, and had 21st-century teachers implementing 21st-century pedagogical practices. The data further revealed that most of the components were being implemented or utilized. This study demonstrated that the school has implemented structures and is maintaining practices that support a student becoming employable in the 21st century.

Consequently, Scoular (2020) presented three prerequisites and 10 key steps in integrating 21st century skills into an education system. An aligned approach to skills integration requires considerations of assessment, curriculum, and pedagogy. In

an aligned system, educators with expertise in curriculum development, assessment design, and pedagogical strategies formulate the support structures and substance required to form a coherent approach. Many factors impact on such an outcome, including actual infrastructure, governance mechanisms, and funding, as well as cultural and philosophical perspectives held in a country.

Lastly, Darling-Hammond (2017), teacher effectiveness has rapidly risen to the top of the education policy agenda, as many nations have become convinced that teaching is one of the most important school-related factors in student achievement. Thus, teacher preparation and development are key building blocks in developing effective teachers. This article describes teacher education in jurisdictions around the world that have well-developed systems for recruiting, preparing, inducting and supporting teachers. Examining their efforts is valuable for several reasons. First, they broaden the view of what is possible. Second, international comparisons show how ideas work in practice at the system level.

Teaching Efficacy

Angeles (2017) conducted a study on “Teaching Efficacy, Interpersonal, Intrapersonal Skills and Teaching Performance”. The self-report of teachers on their efficacy was utilized to know more the samples’ perception on teaching and their attitude in the teaching-learning process. The data on teaching performance were generated from the peer and student sample through the teaching performance instrument. The following results were derived from the data generated: Teachers’ interpersonal skill is directly related to the teaching efficacy scores. Teachers’ intrapersonal skill is significantly related to the teaching efficacy scores.

Samsa (2015) stated that Finland’s strong press for an equitable high-quality education system has relied substantially on creating a sophisticated profession of teaching in which all teachers hold at least a 2-year master’s degree that encompasses both strong subject matter and pedagogical preparation, and that integrates research and practice. Teaching has become the most sought-after profession after medicine, and many teachers pursue a doctoral degree and then remain in teaching. In a single generation, Finland leapt from a relatively poorly educated nation to a twenty-first-century powerhouse with a current literacy rate of 96%, high graduation and college-going rates and top scores in all areas on the PISA assessments. It is no coincidence that teachers are highly respected and supported. The Finnish view is that teaching should be a long-term profession where people can grow into leadership positions and develop expertise over time.

On the other hand, Farooq and Ahmed (2021) stated that classroom management is a key determinant factor for child upbringing in terms of academic excellence and moral uprightness. To achieve academic excellence and moral uprightness schools must ensure that there is a conducive, adequate, and sustainable friendly classroom environment which enables both learners and instructors to interact freely. It is therefore implying that classroom environment plays a key role in the education sector. For quality achievement and good marketing strategy, the School Heads need to equip their school with modern and standardized systems that make classrooms a pleasant place for learners’ academic achievement. Several scholars define classroom management as indicated below.

Similarly, Macías and Sánchez (2015) explained that classroom management is an action about managing the class environment to become good to establish the learning process successfully. Classroom management is also a term used to describe the method of ensuring that classroom lessons run smoothly without disruptive actions by students compromising the delivery of instruction. Thus, as mentioned earlier, classroom management is related to any action taken by classroom teachers to build a learning environment that promotes positive social interaction, active participation in learning, and self-motivation. Therefore, classroom management refers to the broad range of skills and strategies teachers use to keep students “organized, well-ordered, attentive, on-the-job, and academically effective in the classroom”

In addition, the Philippine Daily Inquirer through Adonis (2020) reported that the Filipino standing on the 2019 Southeast Asia Primary Learning Metrics (SEA-PLM) revealed dismal performance in literacy among the 5 participating countries including Vietnam, Laos, Myanmar, and Malaysia. As thorough, 27% of Filipino Grade 5 pupils were only able to recognize single words, while only 10% of them developed reading proficiency to allow them to secondary education. These performances are effects of the classroom challenges and educational crisis not being addressed properly and immediately by the school, family, community, or its partnerships as manifestations of shared governance and leadership.

Wangdi and Namgyel (2021) shared that disruptive behavior, considered to hinder teacher’s instruction, student’s learning, and the classroom environment, is a significant problem faced by teachers daily in classroom management. With this significance in mind, this study adopted an action research (AR) method to explore the common disruptive behavior that secondary English as a foreign language (EFL) students exhibit in the language classroom, whether seating arrangements can help solve this issue and students’ perceptions regarding this type of behavior. A total of 32 students (males = 20, females = 12) with the age range between 12 to 14 from Dechentsemo Central (public) School in Bhutan participated in this study. Data were collected using observation and semi-structured interviews. The overall findings revealed six common types of disruptive behaviors in the language classroom, most of which could be reduced to a certain extent by using seating arrangements as an intervention strategy. Further, the semi-structured interviews data revealed that the present participants acknowledged that disruptive behaviors in the classroom have negative effects on learning and learning outcomes.

Moreover, Bhadoriya (2015) emphasized the school, and society should develop the facilities to help the teachers develop teaching efficiency. The institutional, social and psychological aspects of teacher motivation should be considered while planning programmes for the teachers. As the men teachers possess low teaching efficiency, they should be given some special consideration to improve their effectiveness in teaching. The teachers above the experience of ten years should be motivated by appreciating their work, incentives for better job responsibilities, considerations for participation in various activities and they should be given proper skill development programme towards a positive lifestyle and teaching efficiency. Self-financed schoolteachers must be put into some in-service training programmes or refresher courses, which help them improve their teaching efficiency.

Another study conducted by Gol (2017) in the elementary and junior high schools, respectively, examined the impact of training of teachers in classroom management techniques among teachers in the idle school. The findings from the study include the significant role of classroom management in the learning of pupils; the importance of discipline in imparting knowledge to the learners; and the significant role of parental involvement in the educative process of the child.

Consequently, Delos Santos (2016) determined the relevance of graduate education on the personal and professional attributes of teachers in public elementary schools in District I-A, Division of Antipolo City during the School Year 2015-2016. The study revealed that the problems encountered by the teachers in pursuing graduate education sometimes involved the lack of free time by

the teachers and their financial capacity to study further. A significant difference exists on the relevance of graduate education in the personal and professional attributes of teachers with respect to professional growth when grouped by civil status, educational attainment and length of service.

In addition, Campbel, et al. (2017) stated that enabling teacher to continue to grow, learn and be excited about their work depends on both ongoing high-quality learning opportunities and career opportunities that enable them to share their expertise in a variety of ways. Around the world, job embedded forms of professional learning are taking greater root, often organized around teachers' work with curriculum development through collaborative planning, lesson study and action research of various kinds. Also increasing in many countries are opportunities for teachers to share their expertise with one another.

II. RESEARCH METHODOLOGY

The study employed the descriptive-correlational research design. The descriptive survey method was used to determine the level of 21st century teaching pedagogy. Likewise, it was used to determine the level of teachers' efficacy. Moreover, the correlation method was used to determine the significant relationship between the 21st century teaching pedagogy and teachers' teaching efficacy. Furthermore, it was used to determine the influence of the 21st century teaching pedagogy on the teacher's efficacy.

The data was obtained from 34 teachers from the 4 chosen schools. The study's respondents were all high school mathematics teachers from Calabanga District. This study utilized a teacher-made questionnaire and a validation checklist. Statistically treated with Weighted Mean, Pearson Product Moment Correlation of Coefficient and Coefficient of Determination.

III. RESULTS AND DISCUSSION

Level of 21st Century Teaching Pedagogy

The teachers' classroom level of the 21st-century teaching pedagogy such as Collaboration, Critical thinking, Creativity, Communication, Character, Compassion and Cross-Cultural understanding were revealed in the succeeding tables.

Collaboration. Achieving a common goal through working with peers and classmates inside the class develop teamwork and collaborative skills. Drawn from the teachers' perspective, it can be observed that all the indicators attained Highly Observed rating. Among those indicators, the indicator Contributes and adds value to cooperate in learning process attained the highest score with a weighted mean of 3.65 interpreted as Highly Observed. On the other hand, the indicator uses new technology to support collaborative work was rated the lowest with the weighted mean of 3.38, which is still regarded as Highly Observed.

Table 1. Level of 21st Century Teaching Pedagogy of Mathematics Teachers along Collaboration

Indicators	Weighted Mean	Int	Rank
Contributes and adds value to cooperate in learning process	3.65	HO	1
Plans time wisely, especially when working in groups.	3.59	HO	2.5
Gives helpful feedback	3.59	HO	2.5
Encourages students to work in teams in solving problem	3.47	HO	4
Uses new technology to support collaborative work	3.38	HO	5
AWM	3.54	HO	

Legend

Range	Interpretation
3.26-4.00	Highly Observed
2.51-3.25	Moderately Observed
1.76-2.50	Less Observed
1.00-1.75	Least Observed

Generally, it can be deduced that mathematics teachers in Calabanga District were applying collaboration in their classrooms. Overall, that yielded an average weighted mean of 3.54 interpreted as Highly Observed. This signified that socialization was already practiced in school; hence, learners can easily work with classmates in pairs or in small groups.

This study was supported by Kadel (2020), trainings and seminars are playing an important role when it comes to addressing the challenges and concerns of educators in the integration of Information Communication Technology (ICT) program in teaching practices. This program could focus on Technological Pedagogical and Content Knowledge (TPACK), which aims to address the needs for educators to be competent enough in this path. By equipping them with the necessary skills and information through training sessions, they can navigate the challenges posed by the lack of well-managed ICT-friendly classrooms and contribute to the improvement of teaching and learning activities. Additionally, these training could empower educators with the autonomy to choose and apply diverse methods and techniques, fostering their professional growth and positively impacting student learning outcome.

Critical Thinking. Data on teachers' teaching practices to develop critical thinking was revealed in Table 2. Having a critical thinking enables one to proficiently collect knowledge, quickly process it, and intelligently analyse it. Teachers' role in developing this skill among the students is crucial since it plays an important factor in achieving optimum learning. Reflected in the teacher's self-assessment, the indicator Encourages open-mindedness in solving problems was rated the highest with the weighted mean of 3.79 identified as highly observed. This signifies that the high school mathematics teachers in Calabanga District gave big importance on being open minded.

Table 2. Level of 21st Century Teaching Pedagogy of High School Mathematics Teachers along Critical thinking

Indicators	Weighted Mean	Int	Rank
Encourages open-mindedness in solving problems	3.79	HO	1
Understands how information may be applied to various situations	3.62	HO	2
Assists learners to draw their own conclusions based on analysis of numbers, facts, or relevant information	3.59	HO	3.5
Allows learners to question and reflect on own knowledge and how to arrive at the opinions and make decisions	3.59	HO	3.5
Recognizes my limitations and come up with fresh alternatives.	3.47	HO	5
AWM	3.61	HO	

Teachers believe that open-mindedness enhances problem solving skills as it gives way to learning new ideas to approach problems from multiple angles and consider alternative solutions. It was followed by the indicator Understands how information may be applied to various situations which attained a rating of 3.62. Subsequently, both the indicator Assists learners to draw their own conclusions based on analysis of numbers, facts, or relevant information and Allows learners to question and reflect on own knowledge and how to arrive at the opinions and make decisions obtained Highly Observed with the weighted mean of 3.59. This accounted for an average weighted mean of 3.61 indicated as highly observed.

The result is supported by the study of Selvaniresa and Prabawanto (2017) that contextual teaching and learning can be successful, when learning used a collaborative interaction with students, a high level of activity in the lesson, a connection to real-world contexts, and an integration of science content with other content and skill areas. It also implies that cooperative and interactive learning was the main strategy and given importance as to posing a mathematical task to students in learning exponential functions. Many researchers found that cooperative learning was especially beneficial to students' reasoning and conceptual understanding.

Creativity. Creativity in the 21st century teaching pedagogy is the practice of thinking outside the box. It is a method of teaching applied by the teachers to develop pupil's ability to look at things differently and find new ways of solving problems. The teachers' practices of teaching applying creativity skills were shown on Table 3.

Table 3. Level of 21st Teaching Pedagogy of High School Mathematics Teachers along Creativity

Indicators	Weighted Mean	Int	Rank
Helps learners to generate their own ideas about how to confront a problem or question	3.59	HO	1
Tests out different ideas and work to improve them	3.56	HO	2
Encourages students to come up with a solution to a difficult, open-ended issue or problem.	3.47	HO	3
Guides learners to create an original product or performance to express their ideas	3.41	HO	4
Applies idea creation techniques such as brainstorming or concept mapping	3.32	HO	5
AWM	3.48	HO	

Drawn from the respondent's evaluation, all the indicators along this aspect obtained highly observed rating. This indicated that teachers were already creative and promoting creativity in all the aspects of teaching from the setting of the objectives of the lesson until generalizations. The indicator Helps learners to generate their own ideas about how to confront a problem or question was rated the highest with a weighted mean of 3.59, interpreted as highly observed. This shows that teachers use necessary questioning techniques particularly the higher level of questions involved in the ability to analyze, evaluate, or create. This encourages students to think more deeply and critically, be a problem solver, motivate discussions, and stimulate students to seek information on their own. On the other hand, the indicator Applies idea creation techniques such as brainstorming or concept mapping was rated the lowest with a weighted mean of 3.32. It is an indication that mathematics teachers should incorporate more activities that will help students organize and visualize information in their lessons. Teachers' perception in all the indicators along this aspect of creativity yielded an average weighted mean of 3.48, interpreted as highly observed.

Several studies have shown ways to improve students' conceptual understanding through teaching models and the use of the medium (Pujiastuti & Haryadi, 2020). In Indonesia, learning through a scientific approach in the mathematics classroom, as recommended by The Ministry of Education and Culture, has improved students' conceptual understanding in secondary and higher education. Similarly, the same result happens in studies on using ICT as a medium in mathematics learning. As an integrated component of teaching and learning, ICT allows learning experiences that are innovative, accelerated, enriched, and deepens skills acquisition. The teacher can mediate students' mathematical concepts through manipulative applications and documents.

Communication. Effective communication skills can enhance teacher's confidence, improve their relationship and increase their ability to express their needs. This interaction will lead to better clarity in understanding the subjects being taught by the teachers. Table 4 shows the teachers' practices of developing pupils' communication through the application of various indicators. Generally, teachers' response along this communication yielded an average weighted mean of 3.65 identified as highly observed.

This shows that the teachers are practicing great communication and can foster a good relationship with their students to allow communication to happen openly and voluntarily.

Table 4. Level of 21st Century Teaching Pedagogy of High School Mathematics Teachers along Communication

Indicators	Weighted Mean	Int	Rank
Uses communication in a purpose such as to inform and motivate	3.77	HO	1
Communicates effectively in diverse environment including multi-lingual	3.68	HO	2
Articulates thoughts and ideas effectively	3.62	HO	3.5
Adopts a communication style that is suited for various situations	3.62	HO	3.5
Knows the different techniques of asking and responding to higher order question	3.56	HO	5
AWM	3.65	HO	

Based on the respondent's self-assessment, it can be noted that mathematics teachers always practice the indicator Uses communication in a purpose such as to inform and motivate with a weighted mean of 3.77 interpreted as highly observed. This indicates that the teachers provide an open and active communication with their students. They also motivate their students to develop independence at work and courage to speak about what they have learned from the lesson.

On the other hand, the indicator Knows the different techniques of asking and responding to higher order question was the lowest applied with a weighted mean of 3.56. In this aspect, teachers still need to develop students' higher order thinking skills. However, teachers should be consistent in applying the different strategies in developing students' response to higher order question. Teachers will encourage students to analyze, think logically, and make decisions. Students will also investigate and create knowledge through inquiry-based learning.

In a similar vein, Zamora and Zamora (2022) investigated the 21st century teaching abilities and teaching standards competency levels of CTE graduates in 2016, 2017, and 2018. The results demonstrated that the teachers' skills and competency are really high. The graduates received great marks for their communication skills, life and job skills, personal growth, and professional development. Considering these characteristics, the teachers performed admirably. The findings demonstrated considerable disparities in graduates' 21st century teaching skills and teaching standards competence levels across various variables.

Character. Teachers' mental, moral and ethical qualities can greatly contribute to the achievement of educational goals and objectives. The teacher's perception along this aspect is shown in Table 5. The data further show that the indicator Encourages students to organize, analyze and evaluate was mostly applied with the weighted mean of 3.79. Teachers believed that along with this aspect, they are giving appropriate encouragement to their students to maximize their full potential. The indicators Encourages learners to develop a positive attitude in Mathematics and Displays courteous and considerate demeanour with co-workers were also rated as highly observed with the weighted mean of 3.74 and 3.71, respectively. This is an indication that the teachers were displaying positive attitude not only with their students but as well as their colleagues. This character of a teacher can be a great factor that can affect student's achievement because they can be an inspiration and role model for the students to study more. However, the teachers agreed that the indicator Knows teaching strategies to minimize anxiety and fear was the least applied with the weighted mean of 3.53, still Highly Observed. This means that teachers had achieved giving sufficient strategies on how to lessen fear and anxiety among their students. Particularly, "math anxiety" is common in some students. As teachers, it is necessary to provide specific interventions on how to reduce students' stress and anxiety to improve their performance.

Table 6. Level of 21st Century Teaching Pedagogy of High School Mathematics Teachers along Character

Indicators	Weighted Mean	Int	Rank
Encourages students to organize, analyze and evaluate.	3.79	HO	1
Encourages learners to develop a positive attitude in Mathematics.	3.74	HO	2
Displays courteous and considerate demeanour with co-workers.	3.71	HO	3
Demonstrates punctuality in accomplishing expected task.	3.62	HO	4
Knows teaching strategies to minimize anxiety and fear.	3.53	HO	5
AWM	3.68	HO	

Overall, teachers' perceptions revealed that the character feature is highly observed, with an average weighted mean of 3.68. This demonstrates that the teachers were extremely aware about immediate and relevant ways for efficiently teaching mathematics to the students. The teacher should learn more about techniques for instruction to reduce anxiety and chaos. Give learners greater opportunities to express the imaginative talents and motivate to accomplish more and excel in class. If the teacher's character is good when instructing the students, the students' chances of excelling during instruction increased.

Bhadoriya (2015) support this study that the school, and society should develop the facilities to help the teachers develop teaching efficiency. The institutional, social and psychological aspects of teacher motivation should be considered while planning programmes for the teachers. As the male teachers possess low teaching efficiency, they should be given some special consideration

to improve their effectiveness in teaching. The teachers with ten years and above experience of should be motivated by appreciating their work, incentives for better job responsibilities, considerations for participation in various activities and they should be given proper skill development programme towards a positive lifestyle and teaching efficiency. Self-financed schoolteachers must be put into some in-service training programmes or refresher courses, which help them improve their teaching efficiency.

Compassion. Compassion is understanding the situation and doing things to lighten the difficulties and challenges. The teachers' practices of developing learners' compassion in the teaching and learning process are revealed in Table 6. For the teachers, all the indicators of developing learners' compassion were highly observed where the indicator Maintains decency and respect at all times considered the most practiced with a weighted mean of 3.82 interpreted as highly observed; while the indicators Listens to students' and discovers their educational needs and Shows a caring attitude rated as the least practiced with the weighted mean of 3.77 still highly observed. This implies that teachers always uphold the ethical standards of decency. However, they still need to improve the practice of good listening behaviors not only to increase the understanding but also to boost the feeling of empathy on their students.

The average weighted mean along this aspect resulted to 3.79 signified as highly observed. This indicates that the mathematics teachers in Calabanga District believe they are practicing and exhibiting appropriate level of compassion for their students' and colleagues to encourage professional and effective relationships with either.

Table 6. Level of 21st Century Teaching Pedagogy of High School Mathematics Teachers along Compassion

Indicators	Weighted Mean	Int	Rank
Maintains decency and respect at all times.	3.82	HO	1
Maintains a learning environment of courtesy and respect for different learners.	3.79	HO	2.5
Monitors progress of students and fosters their success.	3.79	HO	2.5
Listens to students' and discovers their educational needs	3.77	HO	4.5
Shows a caring attitude	3.77	HO	4.5
AWM	3.79	HO	

Farooq and Ahmed (2021) support this study that classroom management is a key determinant factor for child upbringing in terms of academic excellence and moral uprightness. To achieve academic excellence and moral uprightness schools must ensure that there is a conducive, adequate, and sustainable friendly classroom environment which enables both learners and instructors to interact freely. It is therefore implying that classroom environment plays a key role in the education sector. For quality achievement and good marketing strategy, the School Heads need to equip their school with modern and standardized systems that make classrooms a pleasant place for learners' academic achievement.

Additionally, Angeles (2017) conducted a study on teaching efficacy, interpersonal, intrapersonal skills and teaching performance. The following results were derived from the data generated: Teachers' interpersonal skill is directly related to the teaching efficacy scores. Teachers' intrapersonal skill is significantly related to the teaching efficacy scores.

Cross-Cultural Understanding. Teachers' ability to handle and understand learners with different cultural background is one of the keys to the success in teaching-learning process. Table 7 shows teachers' practices along this aspect through the application of the various indicators. Teachers' assessment showed that all the indicators along this aspect of cross-cultural understanding were rated as highly observed. The indicator Recognizes and employs strategies that make all students feel seen, embraced and worthy was rated the most applied with the weighted mean of 3.79, interpreted as Highly Observed. It can be deduced that Mathematics teachers have practised and worked with excellence ensuring that inclusivity was addressed. That is, all kinds of students were accepted and catered to with the best education they need. They give importance in valuing students' self-worth. On the other hand, the indicator Enhances one's knowledge of norms, values and behaviors" had the lowest rating with a weighted mean of 3.50 Highly Observed.

This suggests that teachers within the Calabanga District were knowledgeable with the various expectations and behaviors. Learning about one's culture may be challenging as this cultural diversity, however, as teachers, providing appropriate strategies on now to address this is very crucial. Teachers should improve on implementing inclusivity in school. Recognizing and understanding why students behave in certain ways can prevent misunderstandings based on cultural differences.

Generally, this accounted for a general weighted score of 3.65 identified as Highly Observed. This indicates that these high school mathematics teachers of Calabanga District are actively adopting strategies to address cross-cultural differences of their students that can be observed in the classrooms. They can give students an open and acceptable environment that allows students to be more familiar with themselves and their cultures.

Table 7. Level of 21st Century Teaching Pedagogy of High School Mathematics Teachers along Cross-cultural Understanding

Indicators	Weighted Mean	Int	Rank
Recognizes and employs strategies that make all students feel seen, embraced and worthy	3.79	HO	1
Applies strategies for creating a welcoming classroom that recognizes and values positive school culture and fosters success for all.	3.71	HO	2

Allows students to discern and communicate cultural differences.	3.62	HO	3.5
Increases students' understanding of their own and other cultures	3.62	HO	3.5
Enhances one's knowledge of norms, values and behaviors	3.50	HO	5
AWM	3.65	HO	

The summary of the teachers' level of 21st century teaching pedagogy is shown in table 2h. From the table, it can be noted that all the skills such as compassion, character, communication, cross-cultural understanding, critical thinking, collaboration and creativity were rated as highly observed. Hence, the overall average weighted mean of 3.63 was also highly observed. Mathematics teachers in Calabanga District were confident that they addressed 21st century teaching pedagogy in their classroom practice, thus they can provide quality education to their learners.

Table 8. Summary of the Level of the 21st Century Teaching Pedagogy of High School Mathematics Teachers

Aspects	AWM	Int	Rank
Compassion	3.79	HO	1
Character	3.68	HO	2
Communication	3.65	HO	3.5
Cross-cultural understanding	3.65	HO	3.5
Critical Thinking	3.62	HO	5
Collaboration	3.54	HO	6
Creativity	3.48	HO	7
Overall AWM	3.63	HO	

Among all the 21st century teaching pedagogy, compassion was described as frequently observed with the average weighted mean of 3.79, while creativity with an average weighted mean of 3.48 was the lowest. Moreover, all indicators were Highly Observed. This indicated that teachers invested in student's social and emotional well-being. They strengthened teacher-student relationship and created a non-threatening environment where real learning can occur. On the other hand, there was still room for improvement along the aspect of creativity. Creativity is a critical life skill, and teachers can help their students to build it in the classroom and carry those lessons moving forward throughout their lives and careers. By establishing a creative learning environment, students will be encouraged to learn through trial and error, use their imagination and think critically to solve problems.

Moreover, Stocks (2015) stated that educators must be the agents of change. They must lead the professions. They must define what good teaching and learning looks like. Teachers must ensure that all of them work together to meet the needs of the whole child. Teachers must also be student-centered and must play the long game. Teachers must passionately love their teaching profession to give quality education particularly elementary teachers. This assessment of the teachers' 21st century teaching pedagogy is a way to determine the teachers' weaknesses to provide them with sufficient training that they need to improve their practices. Improving teachers' competence is a way to improve pupils' various skills.

In addition, McGrath and Fischetti (2019) stressed that all the skills of the 21st century pedagogy should be absorbed by the students so that they may make decisions and act accordingly in their natural environment and social condition. These skills can be fostered into them by educators who are actively practicing and implementing them. When inculcated in the students, they become tools for lifelong learning.

Lastly, it was supported by the TPACK Model or Technological and Pedagogical Content Knowledge by Mishra and Koehler cited by Luhmya (2023). It stresses that ICT literacy is not enough to have expertise or knowledge of appropriate pedagogy to deliver the content. Content Knowledge, Pedagogical Knowledge, and Technological Knowledge are not isolated or separated from each other, rather they should be combined and work together to make the teaching-learning process effective. TPACK is the basis of effective technology integration, it provides an understanding of using technologies, pedagogical techniques that use technologies to effectively teach content, knowledge of what makes concepts difficult or easy to learn, and how technology can help redress some of the problems that students face.

Level of Teaching Efficacy of the High School Mathematics Teachers

Classroom management, technology integration and professional development were used to determine the level of efficacy of the high school mathematics teachers. Table 9 shows the level of teaching efficacy of the high school Mathematics teachers along classroom management.

Classroom Management. This pertains to how effective classroom management is for high school mathematics teachers. Teachers that employ unique techniques to deliver fascinating educational experiences match the bill.

The table revealed that practices order and discipline in the classroom is the highest with a weighted mean of 3.77 interpreted as very highly efficient (VHE). This demonstrates that validators concurred that rules, procedures, and discipline are essential to instructors' ability to effectively manage their classrooms for pupils. Maintaining order and discipline is crucial to improving student learning, reducing disturbances, and developing a good rapport between teachers and students. The average weighted mean of 3.61 indicated that they were all classified as very highly efficient. According to the average weighted mean, high school mathematics teachers' degree of efficiency in the classroom was demonstrated by their use of order and discipline. This indicated that the classroom procedures and discipline were appropriately controlled by the teachers. There were three indicators that have the same score (3.56): Prepares the classroom that is conducive to learning, Exhibits authority in the classroom, and observes the conduct of the lesson within reasonable time frame interpreted as Very Highly Efficient. This showed that teachers

prioritized maintaining student interest in lessons and teaching them order and discipline, rather than preparing their environment for learning. Furthermore, the methods of teaching these days call for an approachable and understanding teacher, not an authoritative one. Subsequently, extraneous variables such as distractions and noise can make it difficult for lessons to be done without disruptions or delays.

Table 9. Level of Teaching Efficacy of the High School Mathematics Teachers along Classroom Management

Indicators	Weighted Mean	Int	Rank
Practices order and discipline in the classroom	3.77	VHE	1
Awakens and maintains students' interest in the lesson and class discussion.	3.62	VHE	2
Prepares the classroom that conducive to learning	3.56	VHE	4
Exhibits authority in the classroom	3.56	VHE	4
Observes the conduct of the lesson within reasonable time frame	3.56	VHE	4
AWM	3.61	VHE	

Legend

3.26-4.00	Very Highly Efficient (VHE)
2.51-3.25	Highly Efficient (HE)
1.76-2.50	Less Efficient (LE)
1.00-1.75	Least Efficient (LstE)

Furthermore, three factors received the same score: Prepares the classroom favorable to learning, Exhibits authority in the classroom, and Exhibits authority in the classroom, all with a weighted mean of 3.56, which is read as Very Highly Efficient. Despite having the best score, teachers must be prepared and demonstrate authority toward students. Teachers can preserve order and build a positive classroom culture by providing clear standards, employing positive reinforcement, engaging students, and dealing with discipline appropriately.

Wangdi and Namgyel (2021) supported the study that disruptive behavior, considered to hinder teacher's instruction, student's learning, and the classroom environment, is a significant problem faced by teachers daily in classroom management. With this significance in mind, this study adopted an action research (AR) method to explore the common disruptive behavior that secondary English as a foreign language (EFL) students exhibit in the language classroom, whether seating arrangements can help solve this issue and students' perceptions regarding this type of behavior. The overall findings revealed six common types of disruptive behaviors in the language classroom, most of which could be reduced to a certain extent by using seating arrangements as an intervention strategy. Further, the semi-structured interviews data revealed that the present participants acknowledged that disruptive behaviors in the classroom have negative effects on learning and learning outcomes. Overall, this study built on the previous literature on the importance of frequent change of seating arrangements in the classroom and its positive influence on students' disruptive behaviors in the language classroom.

Technology Integration. This relates to how well the level of teaching efficacy of the high school mathematics teachers being evaluated corresponds to the definition as innovators who employ innovative methods to generate engaging learning experiences.

Table 10 displayed the results of the level of teaching efficiency of high school Mathematics teachers based on technology integration. The data illustrates that the level of teaching efficiency along uses to innovate ways to create exciting learning experiences got a weighted mean of 3.41 interpreted as very highly efficient.

This means that the level of teaching efficiency of high school mathematics teachers employed creative thinking to provide engaging educational opportunities. The data further revealed that the indicator with the lowest rating were Utilizes different types of technology inside the classroom and Applies technology to transform classroom, making them more interactive, student-centered, and customized students' learning styles with a weighted mean of 3.18 interpreted as Very Highly Efficient. This indicates that the raters believed that high school mathematics teachers performed at an effective and efficient level. With an average weighted mean of 3.28 interpreted as very highly efficient, means that the technology integration in the classroom improved students learning progress and innovative methods to create engaging learning experiences.

Table 10. Level of Teaching Efficacy of the High School Mathematics Teachers along Technology Integration

Indicators	Weighted Mean	Int	Rank
Uses technology to innovate ways to create exciting learning experiences.	3.41	VHE	1
Uses technology in teaching to enhance the students' learning progress	3.32	VHE	2
Exchanges ideas in global environment using digital technologies	3.29	VHE	3
Utilizes different types of technology inside the classroom	3.18	VHE	4.5
Applies technology to transforms classroom, making them more interactive, student-centered and customized students' learning styles	3.18	VHE	4.5
AWM	3.28	VHE	

Consequently, Ozdemir (2016) suggested that all individuals are required to have digital or technological competence due to the expeditious and innovative changes in science and technology. Thus, the pre-service teachers perceived that the 21st-century pedagogical competence is closely related to teachers' capability of integrating the technology in the classroom.

According to Fibriasari (2019) stated that communication is sharing thoughts, questions, ideas, and solutions. In the technological age, it is much easier and, at the same time, more difficult to communicate. Technology has supplied more convenient methods to communicate, but now and again the numerous ways can turn out to be overwhelming. Collaboration is about running together to reach a purpose and placing talent, expertise, and smarts to work. Just like with communication, the Era has made collaboration easier.

Professional Development. The teacher must continue to develop and improve abilities, knowledge, and competence in a specific field. It comprises of training, education, and learning opportunities that enable professionals to stay up to date on new trends, best practices, and innovations in the industry. Table 11 shows the level of teaching efficacy of the high school mathematics teachers along Professional Development.

Table 11. Level of Teaching Efficacy of the High School Mathematics Teachers along Professional Development

Indicators	Weighted Mean	Int	Rank
Participates in the school-based learning action cell (SLAC) sessions and in-service training	3.68	VHE	1
Attends training/ seminar that aims to enhance and update knowledge of the content areas and pedagogy.	3.53	VHE	2
Enrolled in short and long-term courses such as masters and doctoral studies.	3.24	VHE	3
Offers mentoring and coaching to co-teachers.	3.24	VHE	4
Shares expertise through speakership.	3.09	VHE	5
AWM	3.35	VHE	

The results revealed that participation in school-based learning action cell (SLAC) sessions and in-service training was the highest, with a weighted mean of 3.68, interpreted as very highly efficient. This suggests that raters agreed that instructors require professional development in the form of training that can increase the efficacy. Teachers who are well-equipped with information and exposed to teaching methods, curriculum updates, and educational technologies are more likely to advance professionally. This also enables teachers to share ideas, best practices, and resources with their colleagues. Teachers believe they are better prepared and can deliver good courses. It improves teaching techniques, classroom management, and student participation.

Furthermore, sharing expertise through speakership was the lowest indicator with a weighted mean of 3.09 interpreted as very highly efficient. This demonstrates how effectively knowledge was disseminated via speaking engagements, redefining the professional advancement of teachers. With an average weighted mean of 3.35 interpreted as very highly efficient, this shows that engaging in master's and doctoral programs, as well as short and long-term courses, attends training sessions and seminars to remain up to date on pedagogy and subject areas, and offers coaching and mentoring to other educators benefit and reach highest level of achievement.

This is further supported by the study conducted by Samsa (2015) which showed how the high level of teacher efficiency in Finland is since the teachers are required to hold at least 2-year master's degree. A teacher's professional development and growth is correlated with their level of teaching efficiency. Seeking professional growth for teachers can be beneficial for both the teachers and their students.

Table 12 shows the summary of the level of teaching efficiency of the high school mathematics teachers and the three indicators, namely classroom management, professional development, and technology integration. The data revealed that Classroom management ranked first, with a weighted mean of 3.61 interpreted as Very Highly Efficient. The outcome indicates that the level of teaching efficiency of high school mathematics teachers stimulates and sustains students' interest in the subject and class discussion while enforcing order and discipline in the classroom. It establishes a suitable learning environment in the classroom, displays authority, and monitors the lesson's completion within an acceptable time limit.

Table 12. Summary of the Level of Teaching Efficacy of the High School Mathematics Teachers

Aspects	AWM	Int	Rank
Classroom management	3.61	VHE	1
Professional development	3.35	VHE	2
Technology integration	3.28	VHE	3
OAWM	3.41	VHE	

Professional development ranked second among the aspects, with a weighted mean of 3.35. Technology integration ranked third among the three aspects, with a weighted mean of 3.28 interpreted as very highly efficient. Technology integration ranked last, but also described as Very Highly Efficient. This demonstrates that using innovative-advantage techniques produce engaging educational opportunities; using digital tools to exchange ideas in a global setting and incorporates technology into training to speed up students' learning.

In summary, the overall result of the level of teaching efficacy of high school mathematics teachers was indicated by a weighted mean of 3.41 interpreted as Very Highly Efficient. This demonstrates that mathematics instructors' efficiency in the classroom fulfilled the requirements for high-quality instruction. High-quality standard findings were obtained by the validators, who expressed outstanding approval of Mathematics teachers' teaching efficiency. The quality of the teaching efficiency of teachers was affirmed by the evaluators as Very Highly Efficient. The overall mean of 3.41 demonstrated that these three indicators were Very Highly Efficient. Classroom management was rated as the most efficient of the three characteristics, with an average weighted

mean of 3.61. The teaching efficacy of the high school mathematics teachers was appropriate and suitable for teaching. This shows that the teachers' methods of instruction are valid and effective in the viewpoints of the mathematics high school teachers. This helps to preserve classroom order and norms by keeping students' focus on the subject and the discussion at hand.

In addition, Campbel, et al. (2017) stated that enabling teacher to continue to grow, learn and be excited about their work depends on both ongoing high-quality learning opportunities and career opportunities that enable them to share their expertise in a variety of ways. Around the world, job embedded forms of professional learning are taking greater root, often organized around teachers' work with curriculum development through collaborative planning, lesson study and action research of various kinds. Also increasing in many countries are opportunities for teachers to share their expertise with one another.

In a similar track, Zamora and Zamora (2022) probed the 21st century teaching skills and teaching standards competence level of the CTE graduates of Mindoro State College of Agriculture and Technology (MinSCAT). The results showed that the teachers' skills and competence are high to a very high extent. Specifically, the graduates received high ratings on their effective communication skills, life and career skills, and personal growth and professional development. The teachers showed remarkable performances in the light of these indicators. One-way ANOVA revealed that there were significant differences in the level of the graduates' 21st century teaching skills and teaching standards competence level in terms of the indicators.

The Becker's Human Capital Theory supports this study. In the concept of people enhancing their productivity and efficiency via a greater focus on education and training, high school teachers' efficacy as instructors serves as human capital. These educators who make up the human capital are not only costs; rather, they are investments with guaranteed worthwhile benefits.

Significant Relationship between Level of 21st Century Teaching Pedagogy and Level of Teaching Efficacy

This study hypothesized that the level of 21st century teaching pedagogy is significantly related to the level of teaching efficacy of high school mathematics teachers. Table 13 revealed the test of correlation of these two variables.

Collaboration was significantly related to classroom management, technology, and professional development, as evidenced by r-values of 0.50, 0.42, and 0.43, with p-values of 0.002, 0.013 and 0.012, respectively. The study revealed a significant relationship between critical thinking and classroom management indicated by r-value of 0.38 with p-value of .025. Moreover, critical thinking was not significantly related with technology integration, and professional development with r-value of 0.17 and p-value of .339 and r-value of 0.14 with p-value of 0.438, respectively.

Communication revealed a significant relationship with classroom management indicated by r-value of 0.63 with a p-value of .000. On the other hand, communication was not significantly related with technology integration and professional development with r-value of 0.23 and 0.33, with p-value 0.182 and 0.057, respectively. Furthermore, character when correlated with teaching efficacy revealed positive correlation with classroom management with r-value of 0.43 and p-value of 0.012; technology integration with r value of 0.09 and p

value of 0.617, and professional development with r value 0.03 and a p value of .885 were not significantly related. Moreover, compassion was not significantly related with classroom management, technology integration, and professional development indicated by r-value of 0.01, 0.07, 0.02, respectively with p-value of .575, .705, and .933, respectively.

Lastly, the relationship between cross-cultural understanding and classroom management was significant indicated by r-value of 0.46 with p-value of .006. On the other hand, the relationship with technology integration with r-value of 0.38 and p-value of 0.23, and professional development with r-value 0.31 and p-value of 0.07 indicated no significant relationship.

The results of this study showed that there was a significant correlation between some of the 21st century teaching pedagogy and the teachers' level of teaching efficacy. Significant relationships were found between: Creativity and Classroom Management, Communication and Classroom Management, and Cross-Cultural Understanding and Technology Integration.

Likewise, San Agustin (2019) determined the contextual teaching practices and performance of Senior High School mathematics teachers in the Schools Division of Olongapo City. There were 10 (ten) teacher-respondents purposively selected from senior high school in the Division of Olongapo City. The teachers practiced contextual teaching very often relative to general mathematics. They also always practiced contextual teaching in business mathematics. There was no significant difference in the contextual teaching practices of teachers as to functions and business mathematics when grouped according to profile variables. There was a negligible correlation between the teaching practices and teachers' performance.

Table 13. Relationship between the Level of 21st Century Teaching Pedagogy and Teaching Efficacy

21 st Century Teaching Pedagogy	Teaching Efficacy	r	P-value	Int
Collaboration	Classroom management	0.50	0.002	S
	Technology integration	0.42	0.013	S
	Professional development	0.43	0.012	S
Critical Thinking	Classroom management	0.38	0.025	S
	Technology integration	0.17	0.339	NS
	Professional development	0.14	0.438	NS
Creativity	Classroom management	0.64	0.000	S
	Technology integration	0.41	0.018	S
	Professional development	0.42	0.009	S
Communication	Classroom management	0.63	0.000	S
	Technology integration	0.23	0.182	NS
	Professional development	0.33	0.057	NS
Character	Classroom management	0.43	0.012	S
	Technology integration	0.09	0.617	NS
	Professional development	0.03	0.885	NS

Compassion	Classroom management	0.10	0.575	NS
	Technology integration	0.07	0.705	NS
	Professional development	0.02	0.933	NS
Cross-cultural understanding	Classroom management	0.46	0.006	S
	Technology integration	0.20	0.23	NS
	Professional development	0.31	0.07	NS

The study conducted by Shafiee and Ghani (2022) clearly illustrated that teacher efficacy has an impact on 21st century pedagogical practice. Therefore, teachers need to enhance personal qualities by adding knowledge and skills that are relevant to the needs of the current curriculum. This study also found that teacher efficacy in classroom management and student involvement does not influence 21st century pedagogy. Teachers thus need to be more flexible in teaching sessions, not be too rigid, and serve as facilitators in the T&L process. Teachers need to be optimistic by believing in students' abilities and encouraging more meaningful inquiry-based learning. In addition, this study found that teachers' 21st century pedagogical practice differs based on school category.

The study of Dominado (2020) related to the findings of this study that there is a highly significant relationship between 21st-century skills and technology skills of the teacher respondents. Based on the discoveries, it is recommended that teachers must use technology efficiently for the welfare of students, teachers, and society. Improving the effectiveness of the 21st-century capabilities of educators and systems must contain responsibility for both events and require close attention to a couple of measures. To assist teachers' technology competencies to develop to a high level, administrators ought to provide education incorporating modalities that are relevant to the times.

Extent of Influence of 21st Century Teaching Pedagogy on Teaching Efficacy

This study hypothesized that the level of 21st century teaching pedagogy highly influences the level of teaching efficacy of high school mathematics teachers. Table 14 shows the test of coefficient of determination between the two variables. The data revealed that the influence ranged from weak to moderate.

The table showed that only 3 (out of 21 tests of coefficient of determination) had a moderate effect on correlations. These were: Creativity and classroom management with r^2 value of 0.40; Communication and classroom management with r^2 value of 0.39; cross-cultural understanding and technology integration r^2 value of 0.09. These results indicate that the 21st century teaching pedagogy did have some influence on the teachers' practices of developing teaching efficacy. Although only on certain degrees and parts. It could be inferred that generally, the influence of the 21st century teaching pedagogy on the teaching efficiency of the high school Mathematics teachers is weak.

The study of Mahinay, et al. (2021) is aligned with the test of correlation of this study. Mahinay revealed that the teachers' 21st-century skills or pedagogy are in the average level with the three factors. Correlational study reveals that there is no substantial link between teachers and students in terms of 21st-century competencies.

Table 14. Influence of the Level of 21st Teaching Pedagogy on the Teaching Efficacy of the Teachers

21 st Century Teaching Pedagogy	Teaching Efficacy	R	r^2	Int
Collaboration	Classroom management	0.50	0.253	Weak
	Technology integration	0.42	0.176	Weak
	Professional development	0.43	0.181	Weak
Critical Thinking	Classroom management	0.38	0.147	Weak
	Technology integration	0.17	0.028	Weak
	Professional development	0.14	0.018	Weak
Creativity	Classroom management	0.64	0.405	Moderate
	Technology integration	0.41	0.164	Weak
	Professional development	0.44	0.195	Weak
Communication	Classroom management	0.63	0.391	Moderate
	Technology integration	0.23	0.054	Weak
	Professional development	0.33	0.108	Weak
Character	Classroom management	0.43	0.181	Weak
	Technology integration	0.09	0.007	Weak
	Professional development	0.03	0.000	Weak
Compassion	Classroom management	0.10	0.010	Weak
	Technology integration	0.07	0.004	Weak
	Professional development	0.02	0.000	Weak
Cross-cultural understanding	Classroom management	0.46	0.209	Weak
	Technology integration	0.20	0.038	Moderate
	Professional development	0.31	0.098	Weak

Legend:

Scale	Strength of Correlation
0.01-0.30	Weak
0.31-0.50	Moderate
0.51-0.80	Strong

0.81-1.00

Very Strong

Training Program

The assessment of the 21st century pedagogy and teaching efficacy show that creativity and professional development are among the aspects needing improvement. Therefore, these aspects are the focus of the training program intended for high school Mathematics teachers in Calabanga District. A training proposal and training matrix was made as a support to Calabanga District High School Mathematics teachers to improve their level of teaching pedagogy and raise their level of teaching efficacy.

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