East Asian Journal of Multidisciplinary Research (EAJMR)
Vol. 4, No. 7, 2025: 3119 - 3138

The 21st Century Skills, Mathematical Resilience and Academic Performance of Grade 10 Public School Learners

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A R T I C L E I N F O

Keywords: Education, 21st Century Skills, Mathematical Resilience, Academic Performance, Descriptive Correlational

Received : 15, June
Revised : 30, June
Accepted: 16, July

A B S T R A C T

The incidence of low achievement in mathematics is alarming. This study is a descriptive correlational design. Descriptive statistics such as mean and standard deviation were utilized to present the status of learners' 21st century skills, mathematical resilience, and academic performance. Moreover, Pearson product moment coefficient correlation was employed to analyze the relationship of 21st century skills and mathematical resilience to academic performance of the learners at Sultan Kudarat. Both 21st century skills and mathematical resilience were measured through self-assessed survey questionnaires: Measuring 21st Century Skills in International Study of City Youth and Measuring Mathematical Resilience: An application of the construct of resilience to study of mathematics. Meanwhile, grades were used to ascertain participant's level of academic performance. Results revealed that 21st century skills have significant relationship to academic performance. In contrary, mathematical resilience of the learners have no significant relationship to their academic performance.

DOI prefix: https://doi.org/10.55927/eajmr.v4i7.269
ISSN-E: 2828 – 1519 (Online)
https://mtiformosapublisher.org/index.php/eajmr

INTRODUCTION

Students' academic performance is often associated with the future economic power and competitiveness of a country. Therefore, the desire to understand and identify factors that may have meaningful and consistent relationships with academic performance has been shared among national policymakers and educators around the world (Kupari & Nissinen, 2013). Complexities in learning led to the undeniable fact that many learners still have difficulty defining and classifying mathematics, even though it is an established component of the school mathematics curriculum (Picaza, 2023). Even so, students still struggle learning the subject despite the interventions done to improve their academic performance. Across the globe, the incidence of low achievement in mathematics is alarming. For instance, 63% of the participating countries fall below the average mathematics score set by the Organization for Economic Cooperation and Development (OECD) as shown by the Programme for International Student Assessment (PISA, 2018). This means that many 15-year-old students failed to master basic mathematics skills.

In the Philippines, there are a number of students who illustrate negative attitudes towards mathematics and experience low achievement. In the study of Ogena, Lana, and Sasota (2010), it was mentioned that the result of the TIMSS-Advanced showed that among ten participating countries, Philippines ranked tenth with an average scale score of 355. The country's profile in its own achievement test reflected what is in the TIMSS result. Department of Education (DepEd) reported that grade 10 students in the country were graded 44.1% which means that they performed poorly in the 2016-2017 National Achievement Test (NAT). In addition, the Philippines ranked second from the bottom on the 2018 Programme for International Student Assessment result. The national and local scenario of students' poor performance is not far from the performance of the students in the province of Sultan Kudarat. In 2012 National Achievement Test, the province with mean percentage score of 69.26 ranked eight out of nine provinces and cities in region XII as revealed by the Philippine Information Agency.

Many individuals believe that it is hard to learn Mathematics. Students therefore have to develop mathematical resilience or possess a positive adaptive attitude for them to persevere no matter how difficult understanding mathematics is. Johnson- Wilder and Lee (2013) define mathematical resilience as a positive adaptation that allows students to overcome barriers that are frequently present when learning mathematics. Since Mathematical resilience is a positive affective attitude towards mathematics, then it avoids the experience of anxiety but rather increases student's interest to learn despite its difficulty.

Scholars have reported that affective traits such as motivation and attitude are significant predictors of cognitive activity and improved achievement (Buff, Reusser, Rakoczy & Pauli, 2011). This is supported by the result of the study conducted by Lourdes, Monteiro, Peixoto, and Francisco (2012) that students' attitude towards mathematics and their performance in mathematics are significantly co- related. While identifying the skills considered most important is challenging, the following have in particular received close and concerted

attention from policy makers, researchers and practitioners: critical thinking, creativity, metacognition, self-efficacy, problem solving, motivation, collaboration, conscientiousness and grit or perseverance. These skills and related constructs include those most frequently found in different frameworks and related 21st century skills discussions (Lamb, 2017). Technology helps us with everything, from exploring the vastness of our solar system to passing the time as we wait for our bus. Undoubtedly, technology will be a significant part of our life in 2020. It follows that the considerable influence of technology on education is not surprising. Although many schools utilize technology in the classroom, other institutions are less fortunate. The Philippines' schools currently have a technology gap that prevents pupils from using the benefits technology offers in school (Logroño, Darang, & Picaza, 2023).

A lot of studies have already ventured on Psychological Resilience but not on Mathematical Resilience. According to Rivera and Waxman (2011) little consensus exist around its definition and no measures have been thoroughly developed. Johnson-Wilder and Sue (2013) conducted a study on the construct of measuring mathematical resilience which they developed and validated an instrument measuring mathematical resilience. However, only few studies have been conducted using the construct of mathematical resilience that they have thoroughly developed. Furthermore, limited studies also have ventured on the 21st century skills of the students, particularly on the constructs identified by Lamb (2017). To name one, the study conducted by Pack (2017) entitled 21st century skills: The future for students' academic and career success only included collaboration, critical thinking, and problem solving.

This study determined the influence of 21st century skills and mathematical resilience to academic performance of the grade 10 learners. Specifically, this sought answers to the following questions: 1. What is the status of 21st century skills of the grade 10 learners in terms of: self-management; creativity; communication; collaboration; self-efficacy; hope; belonging; conscientiousness; emotional engagement; cognitive engagement; behavioral engagement; and purpose? 2. What is the status of Mathematical Resilience of the learners in terms of: value; struggle; and growth? 3. What is the status of academic performance of the learners? 4. Is there a significant relationship between 21st century skills and academic performance; and 5. Mathematical resilience and academic performance?

THEORETICAL REVIEW

The study is anchored from the theory on multiple intelligences by Garner which does not point to a single, approved educational approach. Multiple intelligences' concept originated as a psychological theory that focused on individual differences in strengths and modes of representation. Making this process a reality means that education should be student- centered. When a teacher opted to implement the theory of multiple intelligences in daily classroom activities, he must start by trying to identify the intelligences of learners. The theory is significant to create, encourage and develop self-efficacy,

a 21st century skill, and other necessary skills within individual learner, which is most effectively done by direct encouragement of students and providing opportunities for students to experience mastery or success in particular learning tasks (Edutopia, 2016). This implies that learner's 21st century skills is a factor to their academic success.

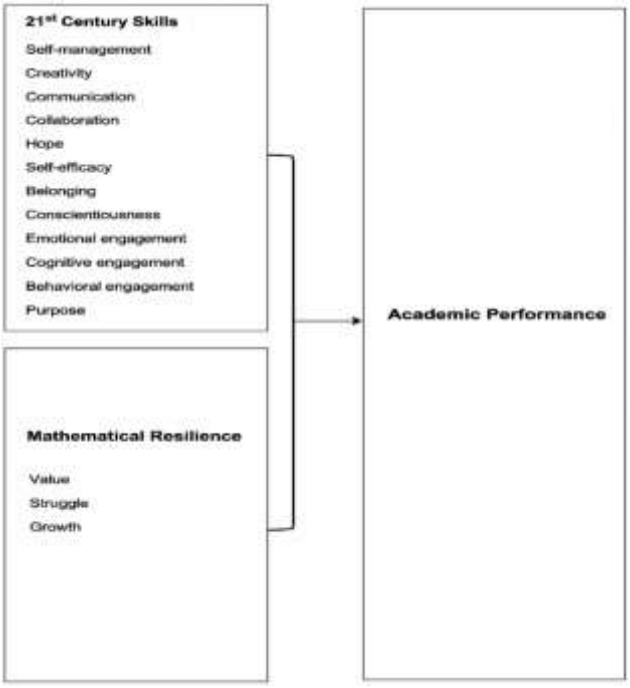

Figure 1. Conceptual Framework

METHODOLOGY

This quantitative study used descriptive correlational design. Quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques. Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon (Babbie, 2010). In a descriptive correlational study, the researcher is primarily interested in describing relationships among variables, without seeking to establish a causal connection (Quaranta, 2017). Descriptive research was used to describe the characteristics of a selected phenomenon and it involved the collection of data without manipulation. Meanwhile, correlational design was used to investigate correlation between variables to developmental studies which seek to determine the changes over time. Also, it measured the degree of association between two or more variables (Cresswell, 2017).

The study was conducted in the municipality of Senator Ninoy Aquino, province of Sultan Kudarat, Region XII. It is located in the southwestern part of the island of Mindanao, Philippines. Among the schools in Sultan Kudarat, all Public Secondary National High School in one cluster, consisting one large school and three small schools, were the respondent schools. Based on the DepEd Order No. 19, series of 2016, the school size such as small, medium, large, or very large depends on the projected enrolment of the school. In such case, large schools

have 841 to 1 240 previous year's enrolment or pre- registration data, whichever is higher. Whereas, small schools have less than 440 enrollees.

The respondents of the study were the bona fide grade 10 public school learners in one cluster enrolled in school year 2019-2020. Its total population was 248. The qualified respondents that were absent on the day of the conduct of study and those participants below 18 years old who failed to present an approved informed consent, were excluded in the poll of respondents. In the same manner, grade 10 learners enrolled in private schools of the same cluster and the public school learners who are not in grade 10 were not considered as respondents. In choosing the respondents, complete enumeration was utilized since the number of grade10 students in the cluster is not too high. Complete enumeration means making all qualified respondents participate in data gathering (Creswell, 2017).

This study utilized adopted questionnaires that were validated, and pilot tested since the questionnaires were formulated in other country, composed of well-planned questions printed on paper that were personally administered by the researcher. It was designed in accordance to the variables reflected in the study. Since the study has three variables, then the questionnaire was also divided into three parts. The first part determined the 21st century skills possessed by the respondents using an adopted questionnaire developed by International Study of City Youth at the University of Chicago (2012). The International Study of City Youth Technical Paper: Measuring 21st Century Skills in ISCY resulted to twelve constructs. It included Gutman and Schoon's (2013) findings on non-cognitive 21st century skills identified in the literature. Furthermore, it bridged the gap between skills and personality. The Cronbach's alpha of the questionnaire is 0.81, denoted as good internal consistency. In interpreting the data, the table below with a 5-point Likert scale from 5 as the highest score and 1 as the lowest score was used to determine the status of respondent's 21st century skills.

On the other hand, an adopted mathematical resilience tool by Johnson Wilder and Sue (2013) was the second part of the questionnaire. The questionnaire obtained a Cronbach's alpha of 0.90 which denoted an excellent internal consistency. It determined the status of students' resilience in terms of value, struggle, and growth which was interpreted using a 5-point Likert scale from 5 as the highest score and 1 as the lowest score. Moreover, the third part of the questionnaire was the learner's academic performance which referred to their grade in mathematics during the third quarter. Prior to the conduct of the study, learners were informed to bring their school form 138-A or the school card. It was an act to ensure that exact grade was taken. In the absence of the school card, the assistance of the mathematics teacher was asked to ensure that the grading sheet was readily available for students to check their grade. Based on the DepEd Order 44, series of 2015, the following interpretation was done.

The statistical tools that were used in the treatment of data were: mean, it was used to determine the status of learner's 21st century skills, mathematical resilience and academic performance. Standard Deviation, it was used to measure the spread of values from the mean. The lower its value, the less

dispersed or varied were respondent's score. And lastly, Pearson Product Moment Coefficient Correlation, it was used in determining the significance of relationship between 21st century skills and mathematical resilience towards student's academic performance.

RESULTS AND DISCUSSION

Status of 21st Century Skills of Learners

Table 1 shows the status of the 21st century skills of grade 10 public school learners at Sultan Kudarat. The indicators used in this variable are self-management, creativity, communication, collaboration, self-efficacy, hope, belonging, conscientiousness, emotional engagement, cognitive engagement, behavioral engagement, and purpose. The over-all 21st century skills of the learners is 3.87 and is denoted high. Meanwhile, its over-all standard deviation equivalent to 0.33 indicates a small range of dispersion to leaner's response. It implies that the learners oftentimes manifest the priority skills and attributes believed to be the most significant to help learners live and work successfully in the 21st century (Tindowen, Basig, & Cagurangan, 2017).

Creativity means being prepared for the future in all its challenging dimensions. It's about connecting, interacting, and supporting all other elements in learning (Allen, 2018). It garnered a mean of 3.84 with a description of moderate and a standard deviation of 0.75. Item 1 of creativity: thinking of new ways to do things has the highest mean of 4.09. It is described as high which means that learners oftentimes find new ways to do things. Item 2: good at coming up with new ideas has the lowest mean equivalent to 3.61. Described as high, it implies that learner oftentimes come up with new ideas. Communication is the practice of conveying ideas quickly and clearly.

Table 1. Status of 21st Century Skills of Grade 10 Learners

21st century skills	Mean	Standard Deviation	Description
A. Self – Management			
1. Focusing in class discussions.	3.14	1.16	Moderate
2. Being productive at school.	2.98	1.13	Moderate
3. Finishing the tasks on or prior to submission time.	3.41	1.23	Moderate
Category Mean	3.18	0.84	Moderate
B. Creativity			
1. Thinking of new ways to do things	4.09	0.81	High
2. Good at coming up with new ideas.	3.61	1.05	High
Category Mean	3.85	0.75	Moderate
C. Communication			
1. Expressing ideas clearly in oral presentations.	3.65	1.01	High
2. Expressing ideas clearly in written text.	3.76	0.95	High
3. Getting ideas across in discussions.	3.59	1.01	High
4. Leading others.	3.33	1.11	Moderate
Category Mean	3.58	0.69	High
D. Collaboration	3.84	1.09	High
1. Understanding how others are feeling.			
2. Getting along well with others.	3.81	0.92	High
3. Working well in groups.	3.97	0.90	High
4. Treating others fairly.	4.02	0.81	High
5. Taking time to help others.	3.85	0.99	High

Category Mean	3.90	0.57	High
E. Hope			
1. Finding a good job when I finish my studies.	4.59	0.67	Very High
2. Hoping for a brighter future.	4.39	0.73	Very High
3. Reaching my goals.	3.54	1.23	Moderate
Category Mean	4.17	0.57	High
F. Self-Efficacy			
1. Being pretty successful as a student.	3.68	1.12	High
2. Thinking of many ways to reach my current goals.	4.19	0.82	High
3. Facing problems in varied ways.	4.10	0.88	High
4. Doing well in school.	4.12	0.97	High
Category Mean	4.02	0.63	High
G. Belonging	4.47	0.69	Very High
1. Feeling safe at school.			
2. Leaving this school with good memories.	4.38	0.78	Very High
3. Enjoying my life at school.	4.40	0.78	Very High
4. Being at school.	4.13	0.97	High
Category Mean	4.34	0.58	Very High
H. Conscientiousness	4.24	0.85	Very High
1. Trying to do my best.			
2. Getting work in on time.	3.34	1.09	Moderate
3. Persevering with a job until it is done.	3.95	0.96	High
4. Working hard.	3.93	0.94	High
Category Mean	3.86	0.59	High
I. Emotional Engagement	1.96	1.20	Very Low
1. Spending time at school.			
2. Feeling of satisfaction from what I do in class.	3.86	1.07	High
3. Having a high level of interest in school work.	4.12	0.94	High
4. Finding most of school work exciting.	2.45	1.18	Moderate
Category Mean	3.10	0.57	Moderate
J. Cognitive Engagement	4.34	0.81	Very High
1. Trying to work as hard as possible.			
2. Putting in my best effort.	4.03	0.87	High
3. Working even if the material is difficult.	4.12	0.89	High
Category Mean	4.16	0.65	High
K. Behavioral Engagement	2.64	1.41	Moderate
1. Attending class regularly.			
2. Notifying my teacher before taking absences.	2.96	1.42	Moderate
3. Respecting my teachers.	2.34	1.28	Moderate
4. Arriving at school on time.	3.27	1.41	Moderate
5. Being in good terms with people at school.	2.30	1.28	Moderate
Category Mean	2.70	0.96	Moderate
L. Purpose	4.49	0.54	Very High
1. Working hard in school matters for success in the workforce			
2. Learning in class is necessary for success in the future.	4.55	0.59	Very High
3. Learning of valuable skills occur in school.	4.40	0.72	Very High
Overall Mean of 21st Century Skills	3.87	0.33	High

Students in the 21st Century lack a pivotal skill to progress their careers without understanding proper communication (Darling-Hammond, 2019). In table 1, the indicator garnered a mean of 3.58 which is denoted as high, with a standard deviation of 0.69. Its item 2: expressing ideas clearly in written text has the highest mean of 3.76. Described as high, it implies that clear expression of ideas is oftentimes manifested by learners. Similarly, item 4: leading others is described as high since its mean is 3.33. It implies that learners are oftentimes good leaders.

Collaboration skills is the ability to work effectively and respectfully in teams to accomplish a common goal (McQuerrey, 2019). It has a category mean

of 3.90 and a standard deviation of 0.57. Its description is high, and it means that learners are oftentimes efficient in team tasks. Its item 4: treating others fairly gained the highest mean of 4.02. Its descriptive equivalent is high which shows that learners are oftentimes treating people equally. In the same way, learners oftentimes socialize well as the lowest mean equivalent to 3.81 gained by item 2: getting along well with others is also described as high.

Hope is being able to set clear and attainable goals, develop multiple strategies to reach those goals, and stay motivated to use the strategies to attain the goals, even when the going gets tough (Zakrzewski, 2012). As presented in table 1, it has a mean of 4.17and a standard deviation of 0.57. Described as high implies that learners are oftentimes consistent in achieving their goals. Having high hope also means that learners do not face the greatest obstacles of learner's with low hope. As shown in the research of Zakrzewski (2012), the obstacle is the inability to move forward from the past challenges.

The item with highest mean of 4.59 is item 1: finding a good job when I finish my studies. Described as very high, it implies that learners are always confident to find a good job upon finishing their studies. Item 3: reaching my goals has the lowest mean and is describe moderate with its mean of 3. As an implication, learners sometimes believe that there is little that can stop them in the attainment of their goal.

Self-efficacy is a personal belief in one's capability to organize and execute courses of action required to attain designated types of performances (Artino, 2012). It obtained a mean of 4.02 and a standard deviation of 0.63. Having a description of high, it implies that learners are oftentimes confident in their ability to complete a task or achieve a goal. Its item 2: thinking of many ways to reach my current goals has the highest mean of 4.19 and is describe as high. Therefore, learners oftentimes think of ways to achieve their goals. The lowest mean was garnered by item 1: being pretty successful as a student is described as high with the mean of 3.68. This means that learners oftentimes claim being successful as a student.

Item 1 in Belonging which says feeling safe at school has the highest mean of 4.47 and is described as very high. The data shows that learners always feel secured at school. Whereas, item 4 being at school gained the lowest mean equivalent to 4.13. Described as high implies that learners oftentimes like attending school. A range of practices is recommended by Lewis (2016) to develop belonging and it includes encouraging teachers to be warm demanders who call out the strengths of individual students, actively challenging stereotypes that students may internalize, strengthening connections between a school and its surrounding community, and taking students on college visits at early ages. It is to help them visualize themselves there.

Conscientiousness, or the tendency to be responsible, organized, and hardworking, had a mean of 3.86 (SD = 0.59), indicating a high level among learners. This reflects traits like self-control, industriousness, and reliability (Fayard, 2019). Item 1, "trying to do my best," scored highest at 4.24 (very high), while Item 2, "getting work in on time," had the lowest mean of 3.34 (moderate), suggesting learners often but not always meet deadlines. These findings align

with Fayard's view that conscientious individuals are goal-oriented and take obligations seriously.

Emotional engagement, or how students feel about learning, had a moderate mean of 3.10 (SD = 0.57). This suggests learners sometimes feel emotionally connected to lessons. The highest mean under this indicator was for Item 3, "having high interest in schoolwork" (4.12, high), showing frequent interest. In contrast, Item 1, "spending time at school," had a very low mean of 1.96, indicating learners rarely enjoy being in school. This may stem from a lack of emotional support and respect, which studies by DeVito (2016) and Reyes et al. (2012) linked to greater student satisfaction and engagement.

Cognitive engagement, or how students think about learning, scored a high mean of 4.16 (SD = 0.65). Item 1, "trying to work as hard as possible," had the highest mean (4.34, very high), showing strong effort. Item 2, "putting in my best effort," followed with 4.03 (high), also reflecting regular dedication.

Behavioral engagement, or students' observable actions in completing tasks, had the lowest indicator mean at 2.70 (SD = 0.96), interpreted as moderate. This suggests inconsistent task completion. Influencing factors may include teachers, school environment, curriculum, and family or community support (Victoria State Government, 2019). Item 4, "arriving at school on time," had the highest mean (3.27, moderate), showing some lateness. Item 5, "being in good terms with people at school," scored the lowest (2.30, moderate), indicating occasional struggles in social interactions. To improve behavioral engagement, students should have more chances for personal expression, clear expectations, emotional safety, and meaningful learning experiences (Almarode & Donohoo, 2018).

The Purpose indicator, which refers to recognizing the relevance of learning to real life (Kelly, 2019), had the highest overall mean at 4.50 (very high). Item 4, "class discussions preparing me for life," had the highest individual mean of 4.55, followed by Item 3, "learning valuable skills" (4.40). These results show that learners see school as essential preparation for their future roles and responsibilities.

Status of Mathematical Resilience of learners

Table 2 shows the status of Mathematical Resilience of grade 10 public school students at Sultan Kudarat. The indicators used in this variable are value, struggle, and growth. The overall mean and standard deviation are 4.12 and 0.48, respectively. It signifies high mathematical resilience among students and that mathematical resilience is oftentimes manifested by them. Also, the response provided by the respondents are dispersed in smaller range. The result implies that learners believe that the ability to learn and master mathematical concepts is not exclusive and limited to few individuals, and that anyone can improve their skills and become better in mathematics; understand the medium of mathematics; understand that in order to develop mathematical concepts, effort, perseverance are required; and recognize the importance of significant others in the support they need (Johnston- Wilder & Lee, 2013).

Resilient people have solid goals, and a desire to achieve those goals, are empathetic and compassionate, however, they don't waste time worrying what others think of them. They maintain healthy relationships, but don't bow to peer pressure, never think of themselves as victims, they focus their time and energy on changing the things that they have control over. It was shown that a student's theory of intelligence is malleable, it predicts academic performance over time, and that a growth theory of learning improves achievement (Yeager & Dweck, 2012).

Value refers to the perspective that math is significantly of high importance and knowledge that is all worth the hassle (Butler, 2016). It garnered the lowest category mean of 4.06, denoted as high. This implies that learners oftentimes find studying mathematics valuable in attaining their current or future goals, how this relates to intrinsic and extrinsic motivation, and the role of self-regulation. Optimistic people view the effects of undesirable events as temporary rather than permanent (Butler, 2016).

Item 1 Mathematics is essential for my future has the highest mean of 4.21, denoted as very high. The data shows that learners always recognize the significance of mathematics to their future. Meanwhile, item 2 Mathematics' concepts are necessary to learn other school subjects and item 10 People who are good at mathematics have more opportunities than those who are not good in math gained the lowest mean of 3.84, denoted as high. Oftentimes, learners appreciate the need to learn mathematics as it is useful across discipline. Learners also see the advantage of being good in mathematics. Struggle refers to acknowledging that all students regardless of the level of their mathematical skill suffer the same struggle or difficulties. It has the highest category mean among indicators equivalent to 4.17. Its descriptive equivalent is high which implies that learners oftentimes feel empowered and confident despite difficulties.

Table 2. Status of Mathematical Resilience of Grade 10 learners

Mathematical Resilience	Mean	Standard Deviation	Description
A. Value			
1. Mathematics is essential for my future.	4.21	0.90	Very High
2. Mathematics' concepts are necessary to learn other school subjects.	3.84	1.00	High
3. Mathematics will be useful to me in my life's work.	4.24	0.84	Very High
4. Mathematics courses are very helpful no matter what I decide to study.	4.17	0.86	High
5. Knowing mathematics contributes greatly to achieving my goals.	4.16	0.92	High
6. Having a solid knowledge of math helps me understand more complex topics in my field of study.	4.08	0.88	High
7. Thinking mathematically can help me with things that matter to me.	3.98	0.81	High
8. It would be easy to succeed in life with enough knowledge in mathematics.	3.91	1.00	High
9. Mathematics develops good thinking skills that are necessary to succeed in any career.	4.13	0.89	High
10. People who are good at mathematics have more opportunities than those who are not good in math.	3.84	1.06	High
Category Mean	4.06	0.59	High
B. Struggle			
1. Everyone struggles with mathematics at some point.	4.18	0.97	High
2. Good mathematicians experience difficulties when solving problems.	4.12	0.99	High
3. People who work in math related fields sometimes find math challenging.	4.23	0.82	Very High
4. Everyone makes mistakes at times when doing math.	4.37	0.83	Very High
5. Struggle is a normal part of working on math.	4.43	0.76	Very High
6. People in my peer group struggle sometimes with math.	4.26	0.83	Very High
7. People who are good at math may fail a hard math test.	4.16	0.86	High
8. Making mistakes is necessary to get good at math.	3.88	1.13	High
9. Math teachers are sometimes confused by a math problem.	3.93	1.04	High
10. When someone struggles in math, it doesn't mean they have done something wrong.	4.12	0.94	High
Category Mean	4.17	0.55	High
C. Growth			
1. Math can be learned by anyone.	4.39	0.87	Very High
2. If someone is not a math person, they can still be able to learn much math.	4.40	0.73	Very High
3. If someone is not good at math, there is something that can be done to change that.	4.29	0.84	Very High
4. People are either good at math or they aren't.	4.09	0.93	High
5. Everyone's math ability is not determined at birth.	3.60	1.36	High
6. People have strategies to use when get stuck in trying to solve math problems.	4.18	0.80	High
7. People who are not smart can be good in math.	4.22	0.87	Very High
8. Everyone's math ability can be enhanced.	4.29	0.86	Very High
9. Working harder can help those who perform poorly on math test.	4.41	0.77	Very High
10. Some people cannot learn math.	3.59	1.25	High
Category Mean	4.15	0.56	High
Overall Mean of Mathematical Resilience	4.12	0.48	High

Item 5 Struggle is a normal part of working on math which gained the highest mean value among the items which is 4.43, denoted as very high. Meanwhile, item 8: Making mistakes is necessary to get good at math has the lowest mean under the construct but its mean equivalent to 3.88 is denoted as

high. This further explains that learners oftentimes believe that someone must learn from a mistake to become good mathematician. Learners recognize that to fail from time to time is an inevitable part of living that people make mistakes and occasionally fall flat on faces. The only way to avoid this is to not try unusual things and to not take a risk, living a meager and shuttered existence (Fisher & Frey, 2016).

Growth is about the confidence that all people can develop mathematical skills and disbelief that some are born with or without the ability to learn. It garnered a mean of 4.15 that has a descriptive equivalent to high. It implies that learners oftentimes have the confidence that all people can develop mathematical skills. Resilient people have a disbelief that some are born with or without the ability to learn (Yeager & Dweck, 2012). Item 9 working harder can help those who perform poorly on math test gained the highest mean among items with the mean value of 4.41, denoted very high. It indicates that learners always believe that exerting more effort can improve the performance in mathematics. Item 10, some people cannot learn math, with the mean of 3.59 is described as high. Learners oftentimes believe that some people cannot learn math. With the result, it can be inferred that learners maintain healthy relationships, but don't bow to peer pressure. They focus their time and energy on changing the things that they have control over (Yeager & Dweck, 2012) The result of the mathematical resilience of the learners implies that learners are better equipped to learn from failure and adapt to change. Marilyn Price-Mitchell (2015) reported why resilience was highly developed among the learners and these are as follows: self-reflection through literary essays or small-group discussions were promoted, reflection through personal essays was encouraged, students learnt from student failures, human resilience was discussed into the classroom, and supportive relationships with students was built.

Status of Academic Performance of Learners

Williams (2018) enumerated that academic performance includes schools, who rank students by their general percentage average, awarding special designations such as valedictorian and salutatorian for those who graduate first and second in their class. In the study, it is referring to the grades of the learners.

Table 3 shows that the mean for academic performance is 83.33, described as moderate. It indicates that on average, learners' grades were satisfactory. Grades with the highest frequency range from 75 to 79; it is described as low. It indicates that the grades are fairly satisfactory and so learners passed the subject. Meanwhile, 14 or 8.5 % of the respondents have a very low grade which is below 75. Those were the learners who failed the subject. The data can explain a part why Philippines, with an average scale score of 355, ranked tenth among ten participating countries on the result of the TIMSS- Advanced as cited in the of study of Ogena, Lana, and Sasota (2010). It can also show why Philippines ranked second from the bottom in the 2018 Programme for International Student Assessment result. Furthermore, it provides a basis on the report of the department of Education (DepEd) that grade 10 students in the country were

graded 44.1% which means that they performed poorly in the 2016- 2017 National Achievement Test (NAT).

Table 3. Status of Academic Performance of learners

Grading Scale	Frequency	Percent	Description
Below 75	14	8.5	Very Low
75-79	54	32.9	Low
80-84	28	17.1	Moderate
85-89	37	22.6	High
90-100	31	18.9	Very High
Mean		83.33	Moderate
Std. Deviation		6.44	

Appropriate action is to be done with the findings since grades carry more weight in some industries, especially in technical professions such as law, medicine and finance. In connection with the field of mathematics, it becomes a need for people of all ages to reach, analyze, and apply the mathematical knowledge efficiently and effectively (Williams, 2018).

Significance of the Relationship between 21st Century Skills and Academic Performance

Based on the over-all r value of -0.189 and p-value of 0.016 where p-value is less than 0.05 alpha level of significance, table 4 reveals that learners' 21st century skills significantly influence their academic performance. Its r value shows a very weak negative correlation. Also, the negative value of r means that as one gets larger, the other gets smaller. This is known as inverse correlation. The multiple intelligences by Gardner can explain the relationship of 21st century skills and academic performance. The theory points out that it is significant to create, encourage and develop self-efficacy, a 21st century skill, and other necessary skills within individual learner. It can be effectively done by direct encouragement of students and providing opportunities for students to

Table 4. Significance of the Relationship of 21st Century Skills and Academic Performance in Mathematics

21st century skills.	r	p-value	Remarks
Purpose	-0.052	0.512	Not Significant
Cognitive Engagement	-0.205	0.008	Significant
Emotional Engagement	-0.152	0.052	Not Significant
Conscientiousness	-0.142	0.071	Not Significant
Belonging	-0.029	0.708	Not Significant
Self-Efficacy	-0.075	0.343	Not Significant
Collaboration	-0.058	0.464	Not Significant
Hope	-0.156	0.045	Significant
Communication	-0.010	0.902	Not Significant
Creativity	-0.034	0.663	Not Significant
Behavioral Engagement	-0.054	0.492	Not Significant

Self – Management	-0.095	0.229	Not Significant
Overall Mean of 21st Century Skills	-0.189	0.016	Significant

Statistically, both indicators namely cognitive engagement and hope showed significant relationship to academic performance with r-value of -0.205 and-0.156, and p-value of 0.008 and 0.045, respectively. Both p-value is less than the alpha level of significance which is 0.05. Thus, it exhibits significant relationship to the academic performance.

The result implies that it is necessary for learners to determine and prioritize their main goals, from general to specific. They should know how to construct goals that are both specific and positive in a solutions-oriented approach. They should also recognize that there's more than single way to achieve a goal. Indeed, this can affect academic performance. Besides, researches show that their inability to move past challenges is one of the greatest obstacles for students with low hope Zakrzewski (2012).

Cognitive Engagement has significant relationship to Academic performance. It relates to what the learner is thinking about in the classroom. This type of engagement heavily depends on the specific strategy, task, or activity developed by the teacher. Ideally, the learner is thinking about the content, lesson, or activity and not something outside of the classroom (Almarode & Donohoo, 2018).

Although 21st century skills significantly influence academic performance, the data shows that ten out of its twelve indicators are remarked not significant. The indicator with r value of -0.029 and a p-value of 0.708 is the farthest to 0.05, the alpha level of significance. This shows that belonging, as a 21st century skill, does not guarantee a significant improvement to learner's academic performance. The need to possess both cognitive and non-cognitive 21st century skills might result to a more ideal and satisfying grade. The result contradicts to response of the educators in an Education Week Research Center survey that belonging is significant to academic achievement since students' perceptions of their school culture and their feeling of inclusion affect their motivation to do better (Blad, 2019). Still, belonging is a fundamental human need. When learners don't feel like they belong, when they feel excluded, rejected, or like an outsider, it saps their precious mental resources and energy. It distracts them and keeps them from being fully present in the moment (Lewis, 2016).

Lewis (2016) recommended a range of practices for 21st century skills to bring significant effect to academic performance. It includes encouraging teachers to be warm demanders who call out the strengths of individual students, actively challenging stereotypes that students may internalize, strengthening connections between a school and its surrounding community, and taking students on college visits at early ages to help them visualize themselves there.

In general, the result conforms to what the scholars have reported that 21st century skills of students are significant predictors of improved academic performance and so the variables are significantly correlated (Buff, Reusser, Rakoczy and Pauli, 2011). The International School for City Youth conducted

further researches about 21st century skills and published a literature with the title "Technical Paper: Measuring 21st Century Skills in ISCY". It is emphasized in the paper that the 21st century skills are correlated with academic achievement (Lamb, 2017).

Significance of the Relationship between Mathematical Resilience and Academic Performance

Table 5 reveals that learners' mathematical resilience has no significant relationship to their academic performance. It is based on the over-all r value of -0.131 and p-value of 0.095. Its over-all p-value is more than 0.05 alpha level of significance. This implies that academic performance of the learners is not significantly influenced by their conviction that the ability to learn and master mathematical concepts are limited to few individuals, and that anyone can improve their skills and become better in mathematics (Johnston-Wilder and Lee, 2013). Mathematics performance could be considerably enhanced by concentrating on fostering positive student attitudes, particularly regarding time management and self-efficacy, and enhancing intellectual support, particularly from peers and instructors (Picaza & Cortez, 2023)

Table 5. Significance of the Relationship between Mathematical Resilience and Academic Performance

Mathematical Resilience	r	p-value	Remarks
Value	-0.087	0.270	Not Significant
Struggle	-0.097	0.216	Not Significant
Growth	-0.151	0.053	Not Significant
Overall Mean of Mathematical Resilience	-0.131	0.095	Not Significant

The result of the study is supported by the research conducted by Zuill (2016) about the relationship between resilience and academic success among bermuda foster care adolescents. Its research design was non-experimental correlational and it used a multiple regression to analyze the relationships. Just like the result in this study, there is no significant relationship ($r = .184$, $p = .19$) between resiliency and math achievement.

On the other hand, the result contradicts the findings of the study about relationship between academic resilience and academic achievement among secondary school students in Kiambu County, Kenya by Mwangi, Okatcha, and Ireri (2015) revealed a positive and significant relationship between academic resilience and academic achievement ($r = 0.68$, $p<0.05$). In addition, the study conducted by Lourdes, Monteiro, Peixoto, and Francisco (2012) highlighted that students' attitude which includes resiliency towards mathematics and their academic performance in mathematics are significantly co- related.

Furthermore, the result does not conform with the findings based on the study about the impacts of self-esteem and resilience on academic performance: an investigation of domestic and international hospitality and tourism undergraduate students by Kwek, Bui, Rynne, and So (2013). A weak relationship was detected when the impact of resilience on student to academic

performance was measured. It resulted to t equivalent to 2.01 and p value of 0.044. Thus, at p is less than 0.05, resilience is positively related to academic performance.

Lastly, the study revealed no significant relationship between mathematical resilience and academic performance. Mathematical resilience is the psychological construct that can better explain the behavior individuals adopt when facing challenging and less favorable situations, yet achieving success (Lee & Johnston-Wilder, 2013) while academic performance is learner's grades (Williams, 2018).

CONCLUSIONS AND RECOMMENDATIONS

1. The status of learner's 21st century skills is high. This indicates that they oftentimes manifest the skills. Looking at the indicators, the status of purpose is high while behavioral engagement is moderate. This explains that learners recognize benefit and relevance of learning mathematics but in the process, they are experiencing difficulty in behavioral aspect.
2. The status of mathematical resilience of the learners is high. This indicates that the mathematical resilience of the learners is oftentimes manifested. Furthermore, the status of struggle and value is also high. This signifies that learners expect difficulties, failures, and confusions to be part of the journey in learning mathematics, but they do not really see the relationship of mathematics across discipline as well as the advantage of being good in mathematics.
3. The status of academic performance of grade 10 public school learners is moderate. This indicates that the learner's grade is satisfactory and so the learner passed the subject.
4. There is significant relationship between learner's 21st century skills and academic performance in mathematics. The result implies that the possession of 21st century skills influences the grades of the learners. In contrary, their mathematical resilience showed no significant relationship to academic performance which means that mathematical resilience does not influence their academic performance in mathematics.

Recommendations

1. Since the 21st century skills of the learners are interpreted as high but is moderate in behavioral engagement, then the result should be reported to the division office of Sultan Kudarat. It is recommended that the office may conduct teachers' development workshops, keynote addresses, and conferences about improving student's engagement in the process of learning. With this, revisiting and improving or modifying the activities presented in mathematics learning modules may also be considered. It is to ensure that it promotes behavioral engagement that are achievable especially in rural area where there is an issue on the availability of some indicated materials needed to perform the exercises.
2. The Division of Sultan Kudarat may provide mathematics teachers an opportunity to attend refreshment courses about efficient classroom instruction to improve learner's mathematical resilience. Educators

should aid learners in understanding the value of learning mathematics. In class, real life examples that are connected to other disciplines should be highlighted so that students see that mathematics' concepts are necessary to learn other school subjects. They should also recognize the benefits and advantages of being good in mathematics.

3. The academic performance of the learners is interpreted as moderate. It is recommended that the Division of Sultan Kudarat may come up with action plans and proposals to improve the performance of the learners from satisfactory level to very satisfactory or even up to outstanding. It is suggested that the mathematics specialist, coordinator, and teachers be included in the planning of specific programs to address the concern.
4. Researchers may conduct further studies regarding the root cause of moderate academic performance of learners despite their high 21st century skills and mathematical resilience. Researchers may also replicate the study using a larger population. Large population sizes assist with increasing predictive power, helps with finding significance that is more accurate. In addition, other factors that can affect the academic performance of the learners should also be considered in future studies.

FURTHER STUDY

For further study, future researchers are encouraged to explore the long-term impact of 21st-century skills and mathematical resilience on learners' academic performance across different grade levels and subject areas. Comparative studies involving private and public school learners, or cross-cultural analyses, may also offer deeper insights into how these factors influence student achievement in diverse educational contexts.

ACKNOWLEDGMENT

The researcher would like to express sincere gratitude to all those who contributed to the completion of this study. Special thanks are extended to the school administrators, teachers, and Grade 10 learners from the participating public schools for their valuable time and cooperation. Heartfelt appreciation is also given to the research adviser for their unwavering support, guidance, and expertise throughout the research process. Lastly, the researcher is deeply thankful to family and friends for their constant encouragement and prayers, which served as a source of strength during this academic journey.

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