

Analyzing Teachers' Perceptions of Real-Life Applications of Mathematics: A One-Sample t-Test Based on Personal Life Factors

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ARTICLE INFO	ABSTRACT
Received: 26 Dec 2024 Revised: 18 Feb 2025 Accepted: 26 Feb 2025	<p>The research examined mathematics instructors' perspectives of the applicability of mathematical principles in addressing real-world situations. The objective is to comprehend instructors' perspectives on the practical significance of mathematics, their incorporation of real-world issues into instructional methods, and the obstacles encountered in this process. The research used a mixed-methods approach, integrating surveys and interviews with mathematics instructors to examine their confidence and preparedness in assisting students in connecting abstract mathematical concepts to real-world scenarios. The results indicated that although some educators acknowledge the need of contextualizing mathematics, substantial obstacles persist, such as curricular limitations, insufficient resources, and an absence of training in real-world problem-solving. The study recommended for enhancing teacher training and curriculum development to more effectively facilitate the application of mathematics in practical situations.</p> <p>Keywords: Teachers' perceptions, Mathematics education, Real-life application, Problem-solving, Mathematics curriculum, Educational challenges, Teacher training and Practical mathematics.</p>

INTRODUCTION

Practical applications of mathematics offer context, improve problem-solving abilities, and enable students to recognize the essential role of mathematics across many professions and sectors. One of the most substantial advantages of linking mathematics to real-world issues is that it enables pupils to recognize the significance of their studies. Linking mathematics to real-world issues is a crucial approach for enhancing student engagement, relevance, and significance in the subject. Although numerous students perceive mathematics as an abstract and disjointed field, connecting mathematical principles with practical, daily situations helps enhance their comprehension and appreciation of the subject. Mathematics frequently appears abstract and theoretical; nevertheless, when students encounter real-world scenarios requiring mathematical application, they start to grasp its practical significance. The capacity to utilize mathematical reasoning in daily scenarios, such as calculating interest rates, budgeting personal money, or optimizing company models, provides students with vital life skills. Beyond enhancing the reliability of mathematics, real-life linkages foster the development of problem-solving skills. Students must analyze the situation, choose the suitable mathematical method, and interpret the results within the relevant context when applying mathematics to real-world problems. This technique fosters critical thinking and aids students in cultivating a profound comprehension of the application of various mathematical principles to address intricate, real-world problems. For example, students engaged in projects involving data analysis, such as examining climate change

patterns or forecasting economic results, acquire proficiency in utilizing mathematical tools to make educated judgments. Addressing these difficulties necessitates systemic alterations, encompassing curriculum reform, enhanced access to resources and technology, and focused professional development for educators. By surmounting these obstacles, educators may more effectively include real-world applications into their mathematics instruction, enhancing the subject's engagement and relevance to students' lives.

STRATEGIES FOR CONNECTING MATHEMATICS TO REAL LIFE

Educators may utilize several ways to link mathematics to real-world issues, hence improving student engagement and academic results. An effective approach is the integration of project-based learning (PBL). Project-Based Learning enables students to engage in comprehensive activities that necessitate the application of mathematical principles to address significant, real-world problems. For instance, students may prepare a budget for a school event, design a structure utilizing geometric principles, or evaluate survey data to inform decisions on community matters. Such projects enable students to enhance their mathematical abilities while also cultivating teamwork, communication, and creativity. Problem-based learning (PBL), in which students address particular real-world issues, is an advantageous methodology. Educators might provide difficulties that necessitate pupils to employ mathematical reasoning, such as optimizing travel routes, strategizing optimal material utilization, or calculating probability in athletic contexts. These examples illustrate the application of mathematics across many sectors, such as engineering, logistics, and sports analytics. A crucial method is employing technology to replicate real-world circumstances. Software applications, graphing calculators, and data analysis instruments enable students to simulate real-world scenarios and examine the practical application of mathematical ideas. Students can utilise simulations to calculate population expansion, predict financial results, or illustrate geometric transformations in design and construction. These tools offer an engaging and dynamic method to investigate practical applications of mathematics, rendering abstract concepts more tangible. Notwithstanding the evident benefits, hurdles persist in incorporating real-world issues into mathematical education. A major concern is the design of conventional curriculum, which frequently emphasizes procedural fluency and rote memorization rather than exploratory, problem-based learning. Educators may experience pressure to expedite information delivery, resulting in insufficient time for comprehensive examination of practical applications. Furthermore, standardized testing methods frequently fail to evaluate students' capacity to apply mathematics in practical situations, hence dissuading educators from integrating such methodologies. Furthermore, numerous educators encounter limitations in resources. Creating classes that integrate real-world applications may need extra planning, technological access, and current teaching resources. Inadequate assistance and professional development may hinder instructors' ability to regularly integrate real-life links into their courses.

Curriculum and Instruction in Mathematics:

Incorporating real-world applications into high school mathematics courses is crucial for enhancing student engagement, relevance, and accessibility. The conventional view of mathematics as an abstract and sometimes daunting field might be altered by showcasing its practical use in addressing everyday issues. This method enhances students' comprehension and fosters an appreciation for the significance of mathematical reasoning in many professions and life circumstances. Practical applications of mathematics provide several educational advantages. Initially, they furnish context and significance, rendering abstract concepts more accessible to students. For instance, subjects like algebra and geometry, which may appear unrelated to everyday life, gain clarity when utilised in

activities such as budgeting, building, or sports statistics. These links enable students to understand the application of mathematics beyond the classroom, so enhancing their drive to learn. Secondly, practical applications of mathematics may connect several disciplines. Interdisciplinary learning is facilitated when students utilise mathematical reasoning to address challenges in science, economics, or technology. For example, instructing probability and statistics using illustrations from biology or physics allows students to utilise their knowledge across other fields.

Methods of Integrating Real-World Applications:

Educators can utilise many ways to establish real-world linkages in the mathematics classroom. A approach involves project-based learning (PBL), wherein students engage in prolonged projects necessitating the application of mathematical principles to real-world scenarios. Examples may encompass architectural design (geometry and measurement), data analysis from surveys (statistics), or the formulation of a business strategy including financial forecasts (algebra and calculus). Through Project-Based Learning, students acquire mathematical knowledge while also cultivating abilities such as cooperation, communication, and creativity. An additional successful method involves the utilisation of case studies and problem-based situations. Educators can provide students with practical challenges—such as optimising a budget for a school function or identifying the most effective travel routes between cities—and require them to employ mathematical reasoning to devise answers. By addressing these practical issues, students may enhance their comprehension of mathematics as a tool for decision-making and problem-solving across many professions, including engineering, economics, and data science. Integrating technology into mathematics instruction is an effective method to link with real-world applications. Simulation software, graphing calculators, and data analysis tools facilitate students' experimentation with mathematical models and the study of real data. Utilising a software to model population growth or environmental alterations enables students to visualise the effects of mathematical variables in real-world systems. Notwithstanding the evident advantages, incorporating real-world applications into high school mathematics programs poses several problems. A significant obstacle is the conventional framework of the curriculum. Numerous standardised curricula emphasise rote memorisation and procedural fluency, providing less opportunity for the exploration of real-world applications or interdisciplinary linkages. Educators may experience pressure to prioritise exam preparation above fostering creative problem-solving or critical thinking skills. Moreover, certain educators may be deficient in the resources or expertise required to proficiently incorporate real-world applications. Integrating real-world linkages frequently necessitates access to technology, current resources, and professional training. Inadequate assistance may hinder instructors' ability to create lessons that conform to the curriculum while including practical applications of mathematics.

Educators employ several strategies to integrate real-world applications of mathematics into their teaching, rendering abstract concepts more accessible and significant to learners. These strategies facilitate the connection between theoretical mathematics and practical, quotidian application. Several main methodologies encompass

1. Project-Based Learning (PBL): Project-based learning entails students engaging in prolonged projects that necessitate the application of mathematical principles to practical issues. For example, students may prepare a budget for a school event, design a garden utilizing geometric principles, or evaluate survey data to provide solutions for community concerns. Through Project-Based Learning, students participate in problem-solving, teamwork, and critical analysis, while recognizing the direct use of mathematics in real-world contexts.

2. Case Studies and Real-World Scenarios: Educators frequently provide students with practical scenarios or case studies necessitating mathematical thinking for resolution. For instance, students may be tasked with calculating the most effective delivery route for commodities, analysing population growth patterns, or identifying the optimal financial investment choice. These situations illustrate the application of mathematics across several professions and sectors, such as economics, engineering, and environmental science.

3. Interdisciplinary Learning: Integrating practical applications of mathematics sometimes entails combining it with other disciplines, such science, economics, or technology. Educators may partner with other departments to provide classes that need students' application of mathematics to scientific investigations, corporate models, or historical facts. For instance, students could employ mathematics to assess energy efficiency in physics or examine historical economic data in social studies. This multidisciplinary method reinforces mathematical principles and illustrates their applicability across several areas.

4. Use of Technology and Simulation Tools: Technology serves as a potent instrument for linking mathematics to practical applications. Educators utilize graphing calculators, mathematical software, and simulation tools to enable pupils to analyze actual data and simulate real-world situations. Students may utilise software to simulate population dynamics, execute financial models, or construct three-dimensional structures. These tools offer interactive and visual methods for students to engage with mathematical topics in a practical environment.

5. Mathematical Modeling: Mathematical modeling entails constructing mathematical models of real-world phenomena, such forecasting disease transmission, examining traffic patterns, or assessing the effects of climate change. Educators motivate learners to construct models utilizing empirical facts and employ mathematical concepts to address intricate issues. This approach enables students to comprehend how mathematics may be applied to analyze and impact real-world processes.

6. Field Trips and Guest Speakers: Certain educators organize field excursions to locations where mathematics is practically utilized, such engineering companies, financial organizations, or industrial facilities. These excursions enable students to directly witness the application of mathematical principles across several businesses. Likewise, guest lecturers from disciplines such as data science, architecture, or finance may elucidate the practical uses of mathematics in their careers, providing students with insights into vocational trajectories that are fundamentally dependent on mathematics.

7. Everyday Examples in Lessons: Educators often employ commonplace examples to elucidate mathematical concepts, rendering abstract notions more concrete. For example, they may instruct on percentages by analyzing sales discounts, employ mathematics to elucidate architectural designs, or investigate probability through athletic statistics. These examples render mathematics more relevant and assist students in recognizing its significance in their everyday lives.

8. Problem-Based Learning (PBL): Problem-based learning entails providing students with a real-world issue that they must resolve via mathematical reasoning. For example, students may be assigned to enhance a company's logistics, identify the most economical product design, or develop a personal financial strategy. Through the resolution of these issues, students have practical experience in applying mathematics to quotidian situations, so enhancing their critical thinking and problem-solving abilities.

9. Student-Driven Inquiry: In student-led inquiry, educators motivate learners to investigate their interests and uncover the applications of mathematics. A student with an interest in sports may explore the application of statistical analysis in team management or the impact of probability on game strategy. This method enables students to assume responsibility for their education and recognize the connections between mathematics and their areas of interest.

10. Real-Life Data Analysis: Educators can include real-world data into mathematics instruction by having students gather, analyse, and evaluate data from personal experiences or publically accessible sources. Students may monitor and evaluate data about meteorological trends, demographic expansion, or economic markets. This approach cultivates students' competencies in statistics and data interpretation, essential in disciplines such as data science, economics, and public health. By using these methods, teachers help students understand the relevance of mathematics beyond the classroom. These approaches make math more practical, relatable, and valuable in preparing students for real-world challenges.

Objectives:

1. To examine mathematics teachers' perceptions of the relevance of mathematics to real-world problems.
2. To identify the methods teachers use to incorporate real-life applications of mathematics into their instruction.
3. To investigate the challenges teachers face when applying mathematical concepts to real-world problems in the classroom.

ANALYSIS, FINDINGS AND DISCUSSION

Descriptive statistics of personal aspects associated with faculty members can yield significant insights into the influence of these elements on the application of mathematics to real-world teaching challenges. Personal characteristics, including age, educational background, teaching experience, and attitude towards mathematics, affect instructors' methods of linking mathematical principles to practical applications. The age and teaching experience of educators may influence their comfort level in integrating real-world examples. Veteran educators may possess a broader array of examples, but novice instructors could introduce fresh pedagogical techniques or technology resources in the classroom. A background in mathematics or related disciplines may directly influence the confidence and frequency with which educators utilize maths in real-world applications. Educators possessing advanced degrees in mathematics are likely to exhibit enhanced topic expertise, allowing them to deliver more intricate and pertinent applications. By examining these personal aspects, educators and administrators may enhance their understanding of how to assist faculty in establishing more robust links between mathematics and real-world problem-solving, hence increasing students' learning experiences and outcomes. If a substantial proportion of educators with a favourable disposition towards mathematics indicate regular incorporation of real-world applications in their instruction, this implies that individual excitement and confidence in the subject matter profoundly affect pedagogical approaches.

Table.1. Descriptive statistics of Personal factors of faculties

S. No	Personal life factors of faculties		N	Percent	Cumulative Percent	Teachers Perception	
						Mean	SD
1	Age	Up to 30	77	38.5	38.5	3.39	1.302
		31-40	59	29.5	68.0	3.28	1.248
		Above 40	64	32.0	100.0	4.19	1.158
2	Gender	Male	126	63.0	63.0	3.69	0.804
		Female	74	37.0	100.0	3.36	0.838
3	Marital status	Single	112	56.0	56.0	3.10	1.110
		Married	88	44.0	100.0	3.89	1.249
4	Type of Institution	Autonomous	99	49.5	49.5	3.07	1.181
		Affiliated	101	50.5	100.0	3.31	1.057
5	Designation	Assistant Professor	92	46.0	46.0	3.66	.785
		Associate Professor	79	39.5	85.5	3.24	8.098
		Professor	29	14.5	100.0	3.56	1.249

Table 1 displays the descriptive statistics of personal life characteristics for faculty members employed in the study region. The study results indicate that the average values of all mean are more significant than 3. The study area revealed a strong correlation between personal life characteristics and the personal lives of the faculty members. The component with the highest significance is "Above 40 years" (4.19), followed by "Married" (3.89), and the least important factor is the "Autonomous "(3.07)". The quality of instructors, their availability, the adequacy of mathematical facilities, and teacher motivation are critical elements that can profoundly impact mathematics education results and are robust predictors of student performance. Instructor quality pertains to the credentials, instructional abilities, and pedagogical methodologies of educators. An adept and informed lecturer is more likely to engage pupils successfully, cultivating a deeper comprehension and enthusiasm in mathematics. The availability of educators, including teacher-student ratios and class sizes, significantly influences learning, since overcrowded classes or restricted access to experienced instructors can obstruct personalised teaching and prompt feedback. Mathematics facilities, including sufficient learning materials, technological tools, and contemporary classrooms, are essential for improving the learning experience by equipping students with the resources necessary to investigate mathematical topics more efficiently. Ultimately, teacher motivation is a vital element in educational achievement. Enthusiastic educators are more inclined to employ creative pedagogical techniques, commit to student achievement, and provide a constructive learning atmosphere. When these factors converge, the forecast for enhanced student performance in mathematics becomes markedly more robust. Educators encounter several obstacles when integrating mathematical principles with real-world situations in the classroom, which may impede their capacity to properly connect abstract mathematics with practical applications.

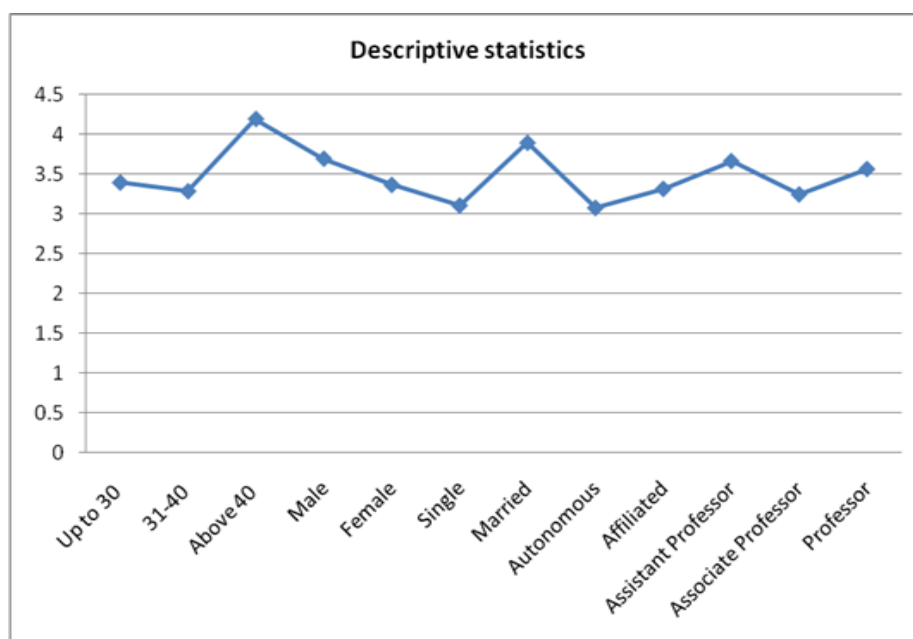


Chart: 01

Table 2. Challenges faced by the teachers when applying mathematical concepts

	Mean	Std. Deviation	Mean Rank	Rank
Curriculum Constraints	3.42	1.326	3.44	III
Limited Resources	3.25	1.262	3.15	IV
Teacher Preparedness and Training	4.20	1.152	4.66	I
Student Readiness and Engagement	3.70	0.797	3.80	II
Time Constraints	3.28	0.796	3.10	V
Assessment Challenges	3.05	1.099	2.85	VI

The result of the descriptive statistics shows that the respondents consider the Teacher Preparedness and Training (4.66) as a challenging factor. Secondly, Student Readiness and Engagement (3.80), followed by Curriculum Constraints (3.44) as third factor. Many mathematics curricula are tightly structured, focusing on specific topics and standardized testing requirements. This leaves little room for teachers to explore real-world applications, as they feel pressure to cover the syllabus and prepare students for exams. Practical problem-solving frequently necessitates additional time and adaptability; nevertheless, the inflexible speed of the curriculum hinders deviation from conventional, procedural education. Utilising mathematical principles for practical issues often necessitates access to specialised resources, such technology, software, or current teaching materials that offer real-world data. In several educational institutions, particularly in poor regions, these resources may be scarce. This constrains educators' capacity to develop practical, pertinent learning experiences, such as data analysis projects or simulations that replicate real-world settings. Not all educators possess the requisite abilities or confidence to include real-world applications into their instruction. Some individuals may lack adequate expertise in connecting abstract mathematical concepts to practical problems or may be unacquainted with interdisciplinary methodologies that integrate mathematics with disciplines such as economics, physics, or engineering. Opportunities for professional

development to mitigate these gaps are not always accessible. A multitude of pupils encounter difficulties with the abstract aspects of mathematics, and the introduction of real-world challenges might occasionally inundate them if they lack the underlying skills to comprehend the practical applications of the math's. Educators may encounter challenges in striking an appropriate equilibrium between presenting students with practical applications and ensuring them possess the fundamental comprehension necessary to address these issues. Furthermore, certain students may not immediately recognize the applicability of mathematics to real-world scenarios, resulting in disengagement. Addressing real-world issues frequently necessitates comprehensive investigation, collaborative teamwork, and a series of procedures that may not be achievable during a single class session. With limited teaching time, it can be tough for instructors to include these more complicated, real-life applications while still addressing the essential curriculum. Furthermore, time-consuming pedagogical approaches, such as project-based learning, may not consistently correspond with the daily requirements of a comprehensive classroom timetable. Numerous standardized tests fail to measure students' capacity to apply mathematics in real-world contexts, prioritizing procedural fluency and theoretical understanding instead. Educators may perceive that dedicating time to real-world applications is less effective in equipping pupils for these examinations. Moreover, evaluating real-world problem-solving abilities might be more subjective and time-intensive, thereby dissuading educators from prioritizing these activities. Educators must take into account the cultural and contextual backgrounds of their pupils while addressing real-world issues. A situation that appears pertinent or recognizable to one group of pupils may be entirely unfamiliar to another, hindering universal engagement with the topic. Formulating issues that are significant and attainable for a heterogeneous student population necessitates meticulous planning and a profound comprehension of individuals' backgrounds and experiences.

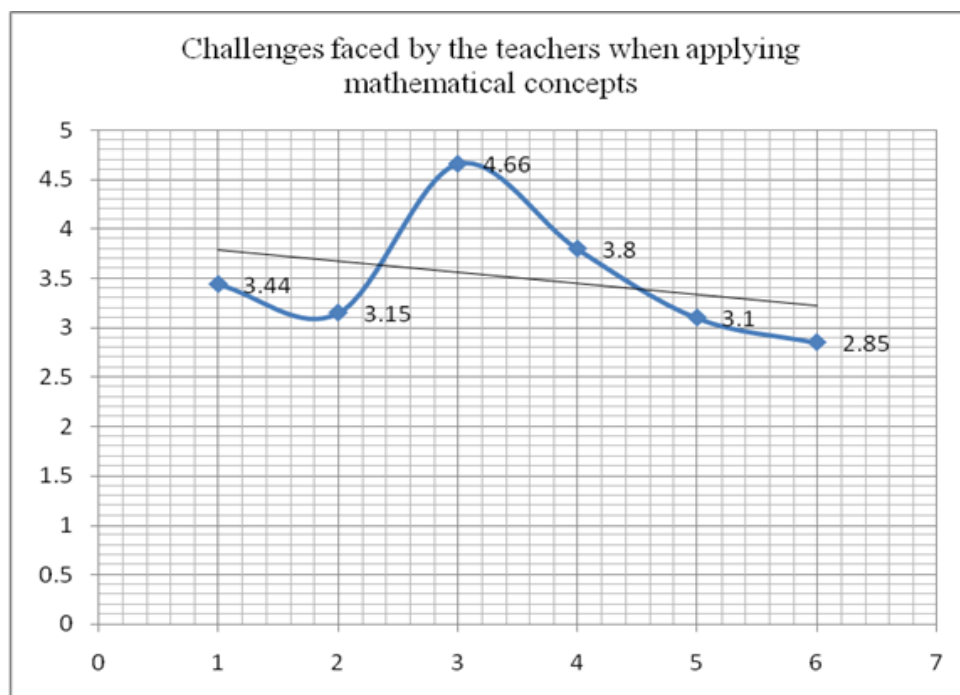
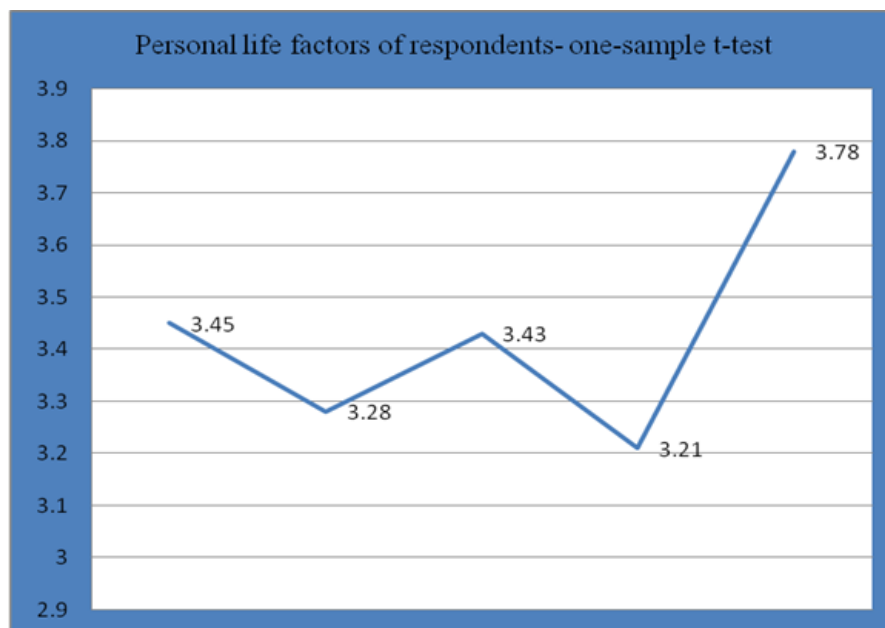


Chart: 02

Table: 3. Personal life factors of respondents- one-sample t-test

Factors	N	Mean	SD	t	p
I try to connect them with real life problems before starting the mathematical concepts	200	3.45	1.345	11.165	<0.001**
Learners enjoy the project works given in Mathematics classes other than merely solving questions	200	3.28	0.872	10.238	<0.001**
I feel my teaching methods give a scope to my learners to connect concepts learnt in classroom to correlate with real life problems	200	3.43	1.263	10.170	<0.001**
Whenever I try to connect concepts with real life problems, it helps me to explain concepts in a better way	200	3.21	0.779	10.124	<0.001**
My teaching style helps in developing the mathematical thinking of the learners.	200	3.78	1.242	11.181	<0.001**

Table 3 reveals one-sample t-test for the personal life factors of faculty members results. The study inferred that the whole statement p-values are <0.01. However, the study confirmed that personal life factors significantly affect the work-life balance among the faculties. Self-efficacy beliefs in mathematical literacy pertain to an individual's confidence in their capacity to comprehend and use mathematical ideas for the resolution of real-world situations. These beliefs significantly influence a student's engagement, motivation, and performance in mathematics. Students with robust self-efficacy in mathematical literacy are more inclined to tackle mathematical activities with optimism, persevere despite difficulties, and maintain confidence in their ability to resolve intricate issues. In contrast, diminished self-efficacy may result in mathematical anxiety, evasion of demanding activities, and a propensity to surrender when confronted with challenges.

**Chart: 03**

Educators may augment students' mathematical self-efficacy by fostering supportive learning settings, delivering lucid explanations, employing real-world examples, and promoting a growth mindset that values effort and perseverance. Enhancing self-efficacy in mathematical literacy is crucial for equipping students to utilize mathematics in daily life, as it affects their propensity to interact with the topic both within and outside the classroom.

CONCLUSION

Integrating real-world links into high school mathematics instruction is essential for enhancing student engagement, relevance, and use of the subject. By illustrating the application of mathematics in daily life and other disciplines, educators may facilitate the development of critical thinking, problem-solving, and interdisciplinary abilities in students, which will benefit them throughout their education and future professions. Nonetheless, addressing problems associated with curriculum design and educator support is essential for the effective execution of these strategies. A mathematics curriculum that prioritises real-world applications might alter students' perspective of the subject and enhance their preparedness for the challenges of contemporary society. Linking mathematics to real-world issues is essential for enabling students to recognise the significance and applicability of the discipline in their daily lives. Through the application of mathematical principles to significant real-world settings, students acquire practical skills, improve their problem-solving capabilities, and cultivate a greater understanding for the significance of mathematics in society. To fully harness the advantages of this method, educational institutions must confront curriculum limitations and provide educators with the necessary resources and training to consistently integrate real-life linkages into mathematics teaching.

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