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MATHEMATICS EDUCATION: ECONOMIC CONCEPTS AND PRINCIPLES MADE EASY

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Abstract

Mathematics education is essential for understanding economic concepts and principles. This paper explores mathematics education to economic concepts and principles made easy. The paper further examined the concepts of mathematics education like algebra, calculus, and statistics, aid economics students in analyzing and interpreting data properly, understanding and applying economic theories, making more informed decisions about financial investments or business strategies, developing strong critical thinking and problem-solving skills and thinking creatively and come up with help economics new ideas. While mathematics education can be a great tool for helping economics students succeed, some challenges need to be addressed. They include challenges of students with different levels of mathematical ability, lack of qualified (mathematics and economics) teachers, lack of real-world applications and the increasing use of technology. The paper concluded that mathematics education is essential for understanding economic concepts and principles because mathematics skills like algebra, calculus, linear equations, linear function, percentages, graphs, and statistics, mathematics education would aid economics students in analyzing and interpreting data properly, understanding and applying economic theories, making more informed decisions about financial investments or business strategies, developing strong critical thinking and problem-solving skills and thinking creatively and come up with help economics new ideas. To handle the identified challenges, the paper suggested among others that schools should ensure the provision of more professional development for math teachers as well as ensure they increase funding for mathematics education by prioritizing it in state and federal budgets.

Keywords: Mathematics Education, Economic Concepts, Economic Principles

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INTRODUCTION

The origins of mathematics education can be traced back to ancient civilizations, such as Egypt, Babylon, and China. However, it was not until the Renaissance that mathematics education began to develop into its modern form (Zhou, 2020). During the Renaissance, scholars such as Leonardo da Vinci and Galileo Galilei began to use mathematics to explain the natural world. This laid the foundation for the development of modern mathematics and mathematics education.After the Renaissance, mathematics education continued to evolve. During the 18th and 19th centuries, new branches of mathematics, such as calculus and statistics, were developed. In the 20th century, mathematics education began to focus more on the practical applications of mathematics. During this time, new fields of mathematics, such as computer science and operations research, emerged (Salkind, 2019). These fields used mathematical concepts to solve real-world problems. Today, mathematics education continues to evolve, with an increased focus on problem-solving and critical-thinking skills. There is also a greater emphasis on the use of technology, such as graphing calculators and computer software, to aid in learning and problem-solving.

Mathematics education includes the study of numbers, shapes, patterns, and equations. It is an essential part of any education system, as it provides the foundation for understanding science, technology, and engineering. The study of mathematics has been intertwined with the study of economics since the early days of modern economics. Early economists, such as Adam Smith and David Ricardo, used mathematics to model economic phenomena, such as the division of labour and the law of comparative advantage (Simmons, 2019). These mathematical models have evolved over time, and today economists use a variety of mathematical tools, such as calculus, linear algebra, and game theory, to analyze economic behavior. One of the most important concepts in economics is the law of supply and demand.In addition, mathematics is a powerful tool for problem-solving and critical thinking. It is also a necessary skill for many careers, such as engineering, medicine, and finance. Today, mathematics education is more diverse than ever before. There are many different approaches to teaching and learning mathematics, and there is an increasing focus on individualized instruction (Jiang & Fischer, 2021). Technology is playing a larger role in mathematics education, and many schools are using computer-based learning programs to supplement traditional instruction. There is also a growing emphasis on the importance of mathematical literacy, or the ability to understand and use mathematics in everyday life.

Mathematics education plays a crucial role in understanding economic concepts and principles so because of its unique concepts like algebra, calculus, and statistics, economists decided to use its concepts to analyze and model economic data, as well as to develop theories and models of economic behaviour. Nevertheless, mathematics education provides the foundation for understanding economic models, such as the law of supply and demand, and the concepts of elasticity and equilibrium (Jiang & Fischer, 2021). Economics as it implies is the study of how individuals, businesses, and governments make decisions about the allocation of resources. It is concerned with the production, distribution, and consumption of goods and services, as well as the factors that affect these processes. So, the use of mathematics in economics is known as mathematical economics. It is a branch of economics that uses mathematical tools and techniques to analyze economic problems.

Mathematical economics is used to model and predict economic behaviour, and it is an important tool for economists and policymakers. For example, mathematical economics is used to predict how changes in government policy, such as tax cuts or interest rate hikes, will affect the economy (Weintraub, 2021). It is also used to study the effects of economic crises, such as recessions or financial bubbles.There are several reasons why mathematics is used in

economics. First, mathematical models allow economists to quantify and measure economic variables, such as income, prices, and output. Economic variables, such as income, prices, and output, can be difficult to measure and track over time. However, by using mathematical models, economists can create a numerical representation of these variables. This allows economists to track and compare economic variables over time, which can help them understand how the economy is changing. In addition, mathematical models can help economists to predict future economic conditions (Arcidiacono & Miller, 2011).

Second, mathematics provides a precise and rigorous framework for analyzing economic problems. Third, mathematical economics allows economists to test and verify economic theories, which can lead to a better understanding of how the economy works. Finally, the use of mathematics in economics can help to improve decision-making by providing a more objective and quantitative basis for making decisions.The third reason for using mathematics education in economics is that it allows for the testing of economic theories. One of the fundamental goals of economics is to develop theories that can explain and predict economic phenomena. However, these theories must be tested and verified to be considered valid. Mathematics provides a way to test economic theories using data and statistical analysis. For example, economists can use mathematical models to test the predictions of a theory, such as the theory of supply and demand. They can then compare the results of the model with real-world data to see if the predictions are accurate (Mankiw, 2016).

Although mathematics education is an important part of economics, many people lack the necessary mathematical skills to understand economic theories and data. This can make it difficult for people to participate in economic decision-making or to fully understand the economic issues that affect their lives (Borghans et al., 2009). Therefore, there is a need for better mathematics education in economics, so that more people can benefit from the discipline. However, there was little research on how mathematics education could be used to improve economic understanding and decision-making as well as on the specific mathematical skills that were needed to understand economic theories and data. This study aimed to fill these gaps by exploring the use of mathematics education in economics and identifying the specific mathematical skills that are required with the hope that this paper would lead to improved economic education and decision-making.

CONCEPTUAL CLARIFICATION

Mathematics Education

Mathematics education refers to the process of teaching and learning mathematics which involves using a variety of methods, including formal instruction, problem-solving, and collaborative learning, to help students develop mathematical skills and understanding. Mathematics education as "the teaching and learning of mathematics, including the development of mathematical concepts, skills, and attitudes (National Council of Teachers of Mathematics, 2014).Mathematics education can also be defined as a body of knowledge that includes the content, processes, and practices of mathematics.By this definition, mathematics education includes the knowledge and understanding of mathematical concepts, such as numbers, operations, geometry, and statistics. It also includes the ability to apply these concepts to solve problems (National Council of Teachers of Mathematics, 2014). In addition, it includes the processes and practices of doing mathematics, such as problem-solving, reasoning, communication, and connections. This definition emphasizes that mathematics education is not just about memorizing facts and procedures, but also about understanding and applying mathematical concepts.

Mathematics education is the process of teaching and learning mathematics, to develop mathematical understanding and skills. This definition focuses on the process of learning mathematics, rather than just the content. It emphasizes the importance of developing mathematical understanding, rather than just memorizing facts and procedures (NCTM, 2014). This definition is based on the idea that students should be able to make connections between different mathematical concepts and use these connections to solve problems.Mathematics education is the development of mathematical reasoning and problem-solving skills" and focuses on the development of higher-level thinking skills. Reasoning skills include the ability to recognize patterns, make generalizations, and draw conclusions from evidence (NCTM, 2000). Problem-solving skills include the ability to identify problems, select appropriate strategies, and evaluate solutions. This highlights the importance of developing these skills in mathematics education and the goal of developing mathematical understanding and skills.

The Key Mathematical Concepts that AreRelevant to Economics

Hsu and Kao (2010) highlighted several key mathematical concepts that are relevant to economics. These include:

Linear Equations:are linear equation is an equation that can be graphed as a straight line. These equations are important in economics because they can be used to model economic relationships, such as the relationship between supply and demand. Linear equations can also be used to solve optimization problems, such as finding the optimal quantity to produce to maximize profits. One example of a linear equation in economics is the equation for a demand curve, which can be represented as Qd = a - bP, where Qd is the quantity demanded, a is the intercept, and b is the slope. These are equations that have a linear relationship between the variables. Another example is the equation y = mx + b is a linear equation. Linear equations are often used to model economic relationships (Paglin, 2013).

Linear Functions:a function that has a straight line as its graph. This means that the change in the output is proportional to the change in the input. In economics, linear functions are often used to model the relationship between price and quantity demanded (Bennett & Briggs, 2015). For example, a linear demand function might be Qd = 50 - 0.5P. This means that for every one-unit increase in price, the quantity demanded will decrease by 0.5 units. Linear functions can also be used to model production and cost functions (Boyce et al., 2010).These are functions that have a linear relationship between the input and output. Another example is the function y = 2x + 3 is a linear function. Linear functions are often used to model economic relationships, such as the relationship between prices and demand.

Basic Arithmetic Operations:are used to perform calculations such as addition, subtraction, multiplication, and division. These operations are used to calculate things like GDP, unemployment rates, inflation rates, and other economic indicators (Landau & Ben-Chaim, 2002). For example, if a country's GDP is #10 trillion and its population is 100 million, then the per capita GDP is #100,000. To calculate this, we use the division operation, dividing the GDP by the population. In economics, basic arithmetic operations are used to perform calculations on both macroeconomic and microeconomic data. These include addition, subtraction, multiplication, and division. These are the fundamental operations that are used in mathematics, and they are also used in economics. For example, economists may use addition to calculate GDP or subtraction to calculate the difference between two economic variables.

Fractions: are an important part of mathematics that is also used in economics. Fractions are used to represent parts of a whole, and in economics, they are often used to represent shares of the economy (McIntosh, 2013). For example, the GDP of a country can be divided into different components, such as consumption, investment, government spending, and net exports. These are called fractional components of GDP. In addition, fractions are used to calculate economic ratios, such as the unemployment rate, which is the number of unemployed workers divided by the total labour force. Fractions are also used to calculate elasticities in economics. Elasticities are measures of how sensitive one variable is to changes in another variable. For example, the price elasticity of demand measures how sensitive the quantity demanded is to changes in price (Houck & Hird, 2010). Fractions are used to calculate this elasticity by dividing the percentage change in the quantity demanded by the percentage change in price. Other elasticities, such as the income elasticity of demand and the cross-price elasticity of demand, are also calculated using fractions.

Percentages: are used to express changes in quantities or values. For example, the percentage change in a country's GDP is the change in GDP divided by the original GDP, expressed as a percentage (Pennock & Wearne, 2006). This is a useful measure because it allows us to compare changes in GDP over time or between countries. Another way that percentages are used in economics is to express relative changes in quantities. For example, the relative change in unemployment is the change in the number of unemployed workers divided by the total number of workers, expressed as a percentage (Hollister et al., 2007). They are also used to express relationships between numbers, such as the percentage change in GDP. Algebra is also important, as it is used to represent and solve mathematical problems which are also used in economics to calculate rates. For example, the interest rate is the percentage change in the amount of money borrowed over a period of time. The inflation rate is the percentage change in the general price level over some time (Davis& Shaw, 2003). The poverty rate is the percentage of people living below the poverty line. These are just a few examples of how percentages are used to calculate rates in economics. They are also used in many other ways, such as measuring the size of economic sectors, like the service sector, and calculating economic indicators, like the consumer confidence index.

Graphs: Just as graphs are used in math to represent functions, they are also used in economics to represent relationships between variables (Chernoff et al., 2003). For example, a supply and demand graph shows the relationship between the price of a good and the quantity supplied and demanded. The graph is a visual representation of the supply and demand functions. Another type of graph used in economics is a production possibility frontier (PPF), which shows the trade-offs between two goods that can be produced with limited resources. These are just two examples of how graphs are used to represent economic relationships. Many other types of graphs are used in economics (Paukert & Roe, 2002).They are used to visually represent data, and they can be used to show economic trends over time. For example, economists may use graphs to show how the unemployment rate has changed over time. Some graphs are the Lorenz curve, which is used to represent income inequality. It shows the distribution of income among different income groups. It is also used to show the relationship between the production of two goods and the amount of resources used to produce them. Yet another example is a market concentration graph, which shows the market share of different firms in an industry (Atkinson, 2010). Some graphs show the effects of government policies, such as tax rates and spending, on the economy.

Functions: are mathematical relationships that are defined by an equation are called functions. One example of a function in economics is the production function. This function relates the inputs used in production, such as labour and capital, to the output, such as the

number of goods produced (O'Grada & O'Rourke, 2020). The production function can be used to analyze how changes in the inputs affect the output. Functions can also be used to model the relationship between two variables, such as the relationship between price and quantity demanded. For example, the demand function for a product may be represented by the equation Qd = a - bP, where Qd is the quantity demanded, a is a constant, and b is the slope of the demand curve (Marshall & Jevons, 2016). This function can be used to predict how price changes will affect the quantity demanded.

These concepts are important because they are used to represent and analyze economic data. Understanding these concepts is essential for developing economic understanding and making informed economic decisions (Mankiw, 2009).

How Mathematics Education Can Be Used to Make Economics Easier to Understand for Students

The following are how mathematics education can be used to make economics easier to the understanding of students:

Provides a Framework for Thinking About Economic Concepts: It provides a common language that can be used to communicate economic ideas. For example, when economists talk about things like elasticity and equilibrium, they are using mathematical concepts that are understood by other economists (Aldrich & Day, 2007). This helps economists to communicate with each other and work together on solving economic problems. Secondly, mathematics education helps economics students to be precise and rigorous in their thinking. When students are using mathematics, you have to be very careful about your assumptions and your logic. This forces economists to think more clearly about the economic issues they are studying.For instance, mathematical models in economics are divided into two main categories: microeconomic models and macroeconomic models. Microeconomic models focus on individual decision-makers, such as consumers and firms, and how they interact with each other. Macroeconomic models, on the other hand, focus on the economy as a whole, including things like inflation, unemployment, and economic growth (Blanchard & Fischer, 2008). Both types of models can be used to understand and predict economic events and trends. However, it is important to remember that all models are simplifications of reality, and they cannot perfectly predict how the economy will behave in the future.

So, while mathematical models can be very useful in helping students understand economic concepts, they should not be relied on exclusively. It is also important to consider real-world examples and evidence when learning about economics. And it is important to remember that economic theories are constantly evolving, and new models are always being developed. But overall, mathematics education provides a valuable framework for understanding economics (Sargent & Stachurski, 2009). Another example is the concept of elasticity can be confusing for students, but it can be made more understandable by using a simple equation to represent it. Similarly, concepts like supply and demand can be made more accessible by using graphs to represent them (Saunders & Tisdell, 2015). In addition, mathematics education can help students understand the relationships between economic variables and how they interact with each other. This can help students to see the big picture of how the economy works, rather than just focusing on individual concepts (Mankiw, 2011). One way that mathematics education provides a framework for thinking about economic concepts is by using models. Models are simplified representations of reality that help us understand complex phenomena. For example, the circular flow model is a simple model of the economy that shows how money, goods, and services flow through the economy. This model can help students understand the relationships between different parts of the economy, such as households,

businesses, and the government (McConnell et al., 2009). Similarly, the Phillips curve model is a model of inflation and unemployment that helps students understand the trade-offs involved in economic policy (Samuelson & Nordhaus, 2010; Gintis, 2009).

Mathematics Education Can Be Used to Teach Economic Concepts in A Way That Is Accessible and Engaging for Students: Some economic concepts can be quite abstract and difficult to grasp. But by using mathematics, these concepts can be broken down into more manageable pieces. This makes it easier for students to understand and remember the concepts. In addition, many students find mathematics to be interesting and stimulating, which can make economics more engaging and relevant to their lives (Varela & Ferretti, 2015). And for students who are interested in pursuing careers in finance or economics, mathematics is a very important skill to have**.**

Mathematics Education Made Easy for Learning Basic Economic Principles (Law of Supply and Demand, Opportunity Cost, and Budget Constraints): This law states that as the price of a good increases, the quantity supplied increases, and as the price of a good decreases, the quantity supplied decreases (Hansen & Mullins, 2009). This can be represented mathematically with a supply curve, which shows the relationship between price and quantity supplied. The law of demand, on the other hand, states that as the price of a good increases, the quantity demanded decreases, and as the price of a good decreases, the quantity demanded increases. This can be represented by a demand curve, which shows the relationship between price and quantity demanded (Gibson, 2013). Opportunity cost is the value of the next best alternative when a choice is made. For example, if students choose to spend their time studying instead of going out with friends, the opportunity cost is the fun they would have had if they went out with friends. This can be represented mathematically by calculating the value of the next best alternative (Gibson et al., 2019). Budget constraints are another important economic principle. This is the limit on how much money you can spend based on their income and the prices of the goods they want to buy.

However, a budget constraint is a line that shows all of the possible combinations of goods that you can buy given your income and the prices of the goods. For example, let's say a studenthas #100 to spend on two goods, X and Y. The price of X is #10, and the price of Y is #5. This means that their budget constraint is a line that goes from (0, 20) to (20, 0), where the x-axis represents the quantity of X and the y-axis represents the quantity of Y (Thomas & Rahman, 2019).

Using Mathematics to Understand Economic Models: Once students have the marginal utility of each good, they can use the concept of marginal analysis to find the combination of X and Y that maximizes their utility. This is the point where the marginal utility of X is equal to the marginal utility of Y. In this example, the marginal utility of X is 5 and the marginal utility of Y is 3 (Andersen & Rieskamp, 2008). This means that students can buy 5 units of X and 3 units of Y to maximize their utility. This is just one example of how mathematics can be used to understand economic models and concepts. The meaning of this mathematical analysis is that it can help students make the best choices given their budget and the prices of the goods they want to buy. In this example, you can see that they can get the most utility (or happiness) by spending their #100 on 5 units of X and 3 units of Y. This is because the marginal utility of X is greater than the marginal utility of Y, so they get more happiness from each additional unit of X than from each additional unit of Y. So, by spending their money in this way, they are getting the most bang for their buck, so to speak (Parkin & Bade, 2018).

The basic idea behind using mathematics to understand economics is that it allows students to see patterns and relationships that might not be obvious to the naked eye. For example, the concept of marginal utility is not something that students would necessarily notice without looking at the data mathematically (Sugden, 2014). By applying mathematics to economic models, students can make predictions about how changes in prices, income, or other factors will affect the choices that people make. And can use this information to make better decisions about how to allocate resources.

How Can Mathematics Skills Aid Economics Students?

There are a few ways that mathematics skills can help an economics student.

Mathematics helps Economics Students to Analyze and Interpret Data properly: This means that by understanding mathematics, economics students can better understand how to use data to draw their conclusion on the state of the economy. They can also be more confident in their conclusions because they know that they are based on rigorous analysis. In addition, by understanding mathematics, students can more easily spot errors or inconsistencies in the data (Schwartz & Markou, 2009). This is because they can use mathematical techniques to test the data for accuracy and consistency. For example, they might use statistical tests to determine whether the data are representative of the entire population or whether they are biased in any way (Fourie, 2012). Another example, an economics student might want to understand the relationship between the unemployment rate and the inflation rate. To do this, the student might use a mathematical technique called regression analysis. This technique involves fitting a mathematical equation to the data and using it to make predictions about how the data might change in the future. For example, the student might use the regression equation to predict the unemployment rate for the next year based on the current data (Mankiw & Taylor, 2011). By understanding the mathematics behind this analysis, the student can gain a deeper understanding of the relationship between unemployment and inflation.An economics student might use mathematical techniques to analyze trends in economic data, such as the unemployment rate or the inflation rate. By understanding the trends, the student can conclude the state of the economy and how it might change in the future.

Mathematics Skills Help Economics Students to Understand and Apply Economic Theories: Analyze and solve equations are used to interpret and analyze graphs, calculate and explain economic indicators, such as inflation and unemployment rateswhile using mathematical models to make predictions about economic trends (Schwartz & Markou, 2011). Mathematics skills to understand and apply economic theories. These skills are important because they allow the student to apply economic theories rigorously and systematically. They also allow the student to interpret and analyze economic data in a way that is accurate and reliable. Without these skills, it would be difficult for the student to fully understand and apply economic theories. For example, the theory of supply and demand is an example. This theory is based on the idea that the price of a good is determined by the interaction of the supply and demand for that good (Parkin, 2014). To apply this theory, an economics student needs to understand the mathematics behind the equations that describe supply and demand. For example, they need to understand how to calculate the equilibrium price, which is the price at which the quantity supplied and the quantity demanded are equal. With this understanding, the student can use the theory to predict how changes in supply or demand will affect the price of a good (Mankiw, 2019).

Mathematics Skills Help Economics Students to Make More Informed Decisions About Financial Investments or Business Strategies: Mathematics skills help students make more

informed decisions about financial investments or business strategies by allowing them to understand and calculate risk (Sodaro, 2012). For example, a student might use probability theory to calculate the likelihood of various outcomes when making an investment decision. By understanding these probabilities, the student can weigh the risks and rewards of different investment options and make a more informed decision (Gillespie, 2017). Similarly, mathematics skills can help students analyze and interpret financial data, such as company earnings and stock prices. In addition to helping students understand and calculate risk, mathematics skills also help them to understand and evaluate the costs and benefits of different options (Farquhar & Norman, 2009). For example, a student might use decision analysis techniques to determine the best course of action in a given situation. This might involve weighing the costs and benefits of different options and then choosing the option that offers the greatest net benefit. In this way, mathematics skills can help students make informed decisions that are based on sound economic principles (Anderson et al., 2009; Thomas, 2014).

A specific example of how mathematics can help students make more informed decisions about financial investments is the use of the capital asset pricing model (CAPM). CAPM is a model that uses mathematics to determine the expected return on an investment. It takes into account the risk of the investment and the expected market return (Hull, 2012). This information can be used to make more informed decisions about which investments to make. For example, a student might use CAPM to decide whether to invest in a particular stock or to put their money in a low-risk savings account.Another specific example of how mathematics can help students make more informed decisions about business strategies is the use of game theory (Hull, 2012). Game theory is a mathematical tool that can be used to analyze the decisions of multiple players in a situation. For example, a student might use game theory to analyze the decisions of two companies competing for the same market share. By understanding the strategies that each company might use, the student can develop a strategy that will give them a competitive advantage (Binmore, 2007). This is just one example of how mathematics can help students make more informed decisions about business strategies.

Mathematics Skills Help Economics Students to Develop Strong Critical Thinking and Problem-Solving Skills: The critical thinking and problem-solving skills that are developed through studying mathematics can be applied in a variety of ways (Snee, 2006). One way is by learning how to approach problems systematically and logically. This involves breaking down the problem into smaller pieces, identifying the key information and assumptions, and then coming up with a plan to solve the problem. Mathematics also teaches students how to identify and evaluate different solutions to a problem. This allows them to choose the solution that is most efficient and effective (Ernest et al., 2018). In addition, students learn how to test and evaluate their solutions to make sure they work as expected. These skills are essential for any career in economics, as they allow them to analyze and solve complex problems. In the same vein, mathematics can help students become better at communicating their ideas and findings (Bazzini & Gaier, 2017). They will be able to use data and models to back up their arguments, and they will be able to explain their ideas clearly and concisely. This is an important skill in any field, but it is especially important in economics (Chiaroni et al., 2018).

Mathematics Skills Help EconomicsStudents Succeed by Teaching Them How to Think Creatively and Come Up with Help Economics New Ideas: This is especially important in economics, where there is often a need to find new and innovative ways to solve problems (Lauridsen, 2018). For example, a student might be faced with a problem such as how to

reduce poverty in a country. They might use mathematical models to come up with solutions such as increasing government spending on social programs, implementing tax incentives for businesses, or providing job training for low-income individuals (Balka & Özdener, 2020). These are just a few examples of the creative solutions that can be developed through studying mathematics.

Challenges to Mathematics Education and Economics Students Success

While mathematics education can be a great tool for helping economics students succeed, some challenges need to be addressed.

Challenge of Students with Different Levels of Mathematical Ability: This can make it difficult to teach economics concepts in a way that is accessible to all students. Additionally, many students find mathematics to be boring or difficult to understand. This can lead to a lack of motivation and engagement in the subject (Kang & Tang, 2020). Finally, mathematics education can be expensive and time-consuming, which can make it difficult for some students to access.

Lack of Qualified (Mathematics and Economics) Teachers: In many schools, there is a shortage of math teachers, which can make it difficult to provide quality instruction. Additionally, many math teachers/lecturers do not have the training and experience needed to effectively teach economics concepts (Auwers & Brooks, 2020). This is a problem because economics is a complex subject that requires a strong foundation in mathematics. Without qualified teachers, students may not be able to fully grasp the concepts they are learning.

Lack of Real-World Applications. Many students do not see the relevance of mathematics to their everyday lives, which can lead to a lack of engagement and interest in the subject. This is especially true for economics, which is often seen as a theoretical and abstract subject (Roschelle et al., 2017). By providing more real-world applications of mathematics, educators can help students see the value of the subject and be more motivated to learn. For example, they could use case studies or hands-on projects to show how mathematics can be used to solve problems in the real world.

The Increasing Use of Technology. While technology can be a valuable tool for learning mathematics, it can also be a distraction. Many students find it easier to use technology to solve problems, rather than learning how to do the math themselves (Redish et al., 2019). This can lead to a lack of understanding of the underlying concepts and a dependency on technology. Additionally, many schools lack the resources to provide adequate technology for all students. This can create a divide between those who have access to technology and those who do not.

CONCLUSION

The paper concluded that mathematics education is essential for understanding economic concepts and principles because mathematics skills like algebra, calculus, linear equations, linear function, percentages, graphs, and statistics, mathematics education would aid economics students in analyzing and interpreting data properly, understanding and applying economic theories, making more informed decisions about financial investments or business strategies, developing strong critical thinking and problem-solving skills and thinking creatively and come up with help economics new ideas. However, several challenges need to be addressed to ensure that all students have the opportunity to learn mathematics effectively. However, it can be challenging for both students and teachers. To address these challenges, educators can provide real-world applications of mathematics, provide adequate training and

support for teachers, and create a positive learning environment for students. With these solutions in place, students will be better equipped to learn and use mathematics to make informed decisions about their economic future bearing in mind that mathematics education is an important tool for learning economic concepts and principles.

Suggestions

The following suggestions can be used to address the challenges identified:

1. Schools should ensure the provision of more professional development for math teacher**s.** This could include workshops, online courses, and mentoring programs. These opportunities would help teachers to stay up-to-date on the latest research and best practices in mathematics education. Additionally, it would allow them to network with other math teachers and share ideas and resources.
2. Schools should ensure theyincrease funding for mathematics education by prioritizing it in state and federal budgets. This would ensure that schools have the resources they need to purchase materials and technology, hire qualified teachers, and provide professional development opportunities. Additionally, it would allow schools to offer more elective math courses, such as statistics or financial literacy, which would give students more opportunities to explore the subject.
3. Schools should offer more incentives for teachers who are willing to teach mathematics, such as higher salaries or signing bonuses. This could help to attract and retain talented math teachers.
4. Schools should provide more real-world applications of mathematics so that students can see its relevance to their everyday lives. One way to provide more real-world applications of mathematics is to incorporate project-based learning into the curriculum. This could involve having students work on projects that require them to use mathematics to solve real-world problems. For example, students could create a business plan for a small business, analyze the performance of a local stock market, or design a new product. This type of learning would allow students to see how the math they are learning is relevant to their future careers and everyday life. It would also help to make mathematics more interesting and engaging for students.
5. Schools should provide more support for students who struggle with mathematics. This could include after-school tutoring or specialized instruction. Another is to incorporate more hands-on activities into mathematics instruction, such as manipulatives and group work. This can help students to better understand the concepts they are learning and make the subject more engaging. Finally, it is important to create a positive learning environment where students feel comfortable taking risks and asking questions.

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