International Journal of Engineering, Science and Mathematics
Vol. 6 Issue 3, July 2017,
ISSN: 2320-0294 Impact Factor: 6.765
Journal Homepage: http://www.ijmra.us, Email: ijesmj@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Mathematical usage of algebra and its importance

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ABSRACT

It is feasible to think of algebra as the language of mathematics, and it plays a big role in deciding whether or not students are capable of following a varied variety of educational pathways in the culture of today. Algebra may be thought of as the language of mathematics. Because of this, it could seem to be common sense that schools should devote a large amount of time to teaching algebra as part of their mathematics curriculum. However, research based on data from a variety of large-scale worldwide studies have showed that algebraic knowledge varies significantly from country to country. These investigations have shown that there are considerable differences across countries. While algebra does not play a big part in the education system of other nations, it does play a significant function in other nations. It has been shown that these discrepancies are stable not just over time but also across a wide range of educational levels. Analyses have been carried out on the basis of the data from all of the studies that have been described up to this point in order to look for patterns in the kind of subject matter that various nations appear to place a focus on when teaching mathematics in schools. The goal of these analyses was to find out which topics receive the most attention in the mathematics curricula of their respective schools.

***KEYWORD**: Different profiles in mathematics education.*

INTRODUCTION

One way to look about algebra is as the mathematical version of a language, which is a useful approach to think about it. If you wish to seek opportunities in a nation, it is universally understood that it is essential for you to have a functional understanding of the language that is spoken in that nation. Concerning algebra, the same claim may be made. It is essential for people to acquire the skill of being able to solve algebraic equations in order to be successful in any area of study or profession that involves the use of this language. Acquiring the language of a country takes time, and that language evolves over the course of time as a result of intensive education via hearing and by training to use it oneself. Acquiring the language of a nation takes time. When compared to adults, young children often have an easier time getting started with the language acquisition process. The same thing may be stated, to some extent, regarding algebra. The one and only distinction is that while studying mathematics, one begins with arithmetic rather than algebra since arithmetic is the basis for algebra. Since this is the case, beginning algebra after reaching a certain degree of competence in arithmetic seems to be an appropriate option.

Everyone in a modern society spends a significant amount of time in school, which helps to prepare them for becoming responsible citizens who are able to take care of their own day-to-day lives and also have jobs that allow them to contribute to society while also providing for their own needs. This helps to prepare them for the fact that they will one day be expected to take care of their own day-to-day lives. It is necessary to find an answer to the topic of what kinds of skills and abilities should be emphasised in educational settings in the cultures of today. Do we just need to put in the effort to teach them algebra as a mathematical language if we teach them fundamental arithmetic and statistics in mathematics to prepare them for their day-to-day lives, or is it sufficient to only teach them basic arithmetic and statistics? In order to maintain a modern society, there must be a significant number of people who have received a comprehensive education in a variety of technological subjects, such as engineering and computer science. Challenges that are intertwined with the economic and the natural environment are something that a modern civilization must deal with. In every one of these domains, an in-depth familiarity with the mathematical language known as algebra is an essential must. In the modern world, a knowledge of algebra is required to pursue a career in a broad number of professions. One of these fields is mathematics, specifically algebra. In addition to this, it is necessary for all types of education in the natural sciences, such as physics, biology, and chemistry, as well as education in mathematics itself. This is because it is the foundation of all of these fields. If you wish to enrol in a university programme that focuses on geometry, it is essential that you have a solid grasp of the language of algebra.

There is a valid reason for algebra to be included in the curriculum of schools everywhere over the world for the same reasons: there is a legitimate purpose for it to be there, and it is the responsibility of the school to teach it to the students. In spite of this, a number of studies have demonstrated that the significance that is put on students learning algebra varies substantially from one part of the world to another. This is true throughout the whole globe. This study provides a summary of the results of a number of comparable studies that have been carried out over the course of the last two decades. It does so by relying on data gathered from a wide range of research that has been carried out at a variety of educational levels. Using these findings as a jumping off point, certain ramifications will be pointed out and explored for both individual students and societies that do not place a strong emphasis on the study of algebra in their schools. These ramifications will apply to societies that do not place a strong emphasis on the study of algebra in their schools.

Role of Algebra in Applied Mathematics

My obsession with algebra eventually led me to the subject of algebraic geometry, which, at the time that I first started studying it, was one of the most esoteric subfields within the discipline of pure mathematics. At the time, I never in a million years would have guessed that twenty-five years later, I would be co-authoring papers with computer scientists, where we would use algebraic geometry and commutative algebra to address issues in geometric modelling. At the time, It never in a million years would have guessed that It would be co-authoring papers with computer scientists. IT would never in a million years have anticipated that It would end up co-authoring papers with computer scientists at the time. That was something It never in a million years could have imagined occurring. The purely theoretical and conceptual aspects of algebra, which were among the very first things It learnt about the topic, have turned out to have important applications in the real world. Based on the fact that these and other applications exist, what can we deduce about the connection between algebra and applied mathematics? The objective of this article is to study certain facets of this link in the hope that doing so may encourage healthy dialogue amongst the engineering, pure and applied science, and operations research departments. It will begin by demonstrating the various applications of algebra in the real world by utilising some examples from the fields of geometric modelling, economics, and splines. My goal is to show how algebra can be used in many different situations. After that, It will talk about computer algebra, and then It will wrap up with some thoughts on the function that algebra plays in the educational framework for applied mathematics. Afterwards, It will cover computer algebra.In this lesson, we will cover Cramer's Rule, Symbolic Linear Algebra, and Economic Theory.

A colleague of mine and It were talking about linear algebra not too long ago, and one of the topics we were talking about was the significance of Cramer's Rule. Cramer's Rule may have played a significant role in the development of linear algebra in the past, but it appears to have less of a place in the field now, particularly given the emphasis that is placed on solving equations through the use of Gaussian elimination. This is particularly the case given the fact that linear algebra is increasingly focused on solving equations through the use of computer programmes. In addition, Cramer's Rule is rendered useless if the coefficient matrix of a set of equations is not well-conditioned enough to meet the requirements set out by the rule. One of my colleagues was contemplating whether or not the topic should be ignored as a result of these circumstances; after all, why should students be obliged to memorise an unnecessary formula? Cramer's Rule has been one of my favourites for a very long time because of the intrinsic beauty it has; yet, this strategy is not always beneficial for students who wish to experience mathematics through the lens of its applications. After giving it a lot of thought, It came to the conclusion that Cramer's Rule, despite the fact that it is not applicable to numerical linear algebra, does have a use in the broader field of applied linear algebra. This is the conclusion It came to after coming to the realisation after giving it a lot of thought.

In order to comprehend the difference, take note that the implementation of Cramer's Rule in equation is a component of geometric modelling and does not involve numerical calculations. This is the most important factor in distinguishing the two. Take the following simple example from the subject of economics as an illustration of yet another use of Cramer's Rule that does not need numerical calculations. The IS-LM model, which analyses the relationship that exists between total national income and the quantity of money in circulation, is based on the ideas developed by John Maynard Keynes. This model looks at the interaction that takes place between the two variables. In light of the information presented in the objective of this study is to grasp

$$Y = \text{total national product}$$

$$r = \text{interest rate}$$

in terms of the parameters of policy (such the amount of money in circulation), in addition to the factors of behaviour (e.g., the marginal propensity to save). Equations for the variables may be obtained from the IS-LM model once it has been linearized at a point of equilibrium.

$$sY + ar \cdot I^o + G$$

$$mY \cdot hr \cdot M_s \cdot M^o,$$

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in which every one of the parameters s, a, m, h, Io, G,Ms, and Mo has a positive sign (for example, Ms is the money supply, and s is the marginal propensity to save). Examining the relationship between changes in the parameters and shifts in the values of Y and r is the purpose of this study. In situations such as this one, Cramer's Rule truly shines since it offers equations for Y and r that make it easy to get the solutions to questions such as these. Both this example and the one that came before it have one thing in common: they both involve the application of Cramer's Rule to equations whose solutions are dependent on the input parameters . As a direct result of this, the application of linear algebra includes both numerical and symbolic aspects. Are the linear algebra classes that we now offer sufficient to address both facets of the topic? At the moment, the equation det(A In) for the characteristic polynomial of a n by n matrix A is the setting in which a symbolic parameter is most often found. This is because this equation is used to determine the value of the characteristic polynomial. This is due to the fact that this equation is used in the process of computing the characteristic polynomial. As can be seen from the examples that have been offered thus far, the determinants that make use of symbolic aspects have a function that is much more crucial to play, even at the most fundamental level. When we explore what it means in algebraic terms to conduct linear algebra with parameters, the relationship between the two ideas becomes much more substantial. Parameters are a kind of variable that may be used in linear algebra. Make the assumption, for the purpose of clarity, that the independent parameters t1,...,tn appear in the equations in a manner that is logically consistent (e.g., no square roots or exponentials of parameters). When performing operations in linear algebra, it is customary to work over the rational function field K = R. This is because linear algebra necessitates the use of a field (t1,...,tn). However, there are a great many situations in which the parameters appear in a polynomial way, and the denominators offer complications. This may be a challenging situation. In order to accomplish this goal, linear algebra will need to be carried out on the polynomial ring denoted by R = R[t1,...,tn]. It is known that when used in this context, "vectors" refer to vectors of polynomials. These vectors of polynomials may be thought of as members of a free module that is defined over R. As an example, the syzygy module is constructed by the polynomial solutions (A, B, C) R3 of the linear equation Aa + Bb + Cc = 0. According to this equation, which assumes that a, b, and c are constants, the syzygy module may be constructed using these answers (4).

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Journal Homepage: http://www.ijmra.us, Email: ijesmj@gmail.com
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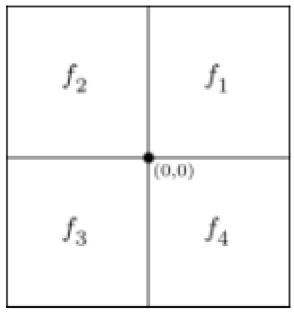
The different roles of Splines and Modules

The connection that exists between linear algebra and modules is shown in yet another way by the field of multivariate spline research. Take, for instance, the spline that is shown in figure 1; this is one example.



spline illustrated in Figure 1.

Algebra Applied to Computers and Traditional Algebra In the course of the last forty years, we have seen the growth of substantial computing capability in addition to the discovery and, in some cases, the rediscovery of fundamental algorithms for symbolic computation. In certain cases, the fundamental algorithms have been rediscovered. There has been a surge of research, both basic and applied, as a direct result of the interrelated nature of the most recent technological breakthroughs. There is a wide variety of literature available in this discipline, ranging from textbooks designed for first-year students to monographs written specifically for advanced scholars. The authors of some of these publications aimed their writing at specialists in algebraic geometry and commutative algebra, while authors of other works wrote their texts for a more general audience. Coset enumeration, the theory of Galois, modular arithmetic, symbolic integration, symbolic summation, difference equations, power series, and special functions are only few of the many subfields that fall under the umbrella of computer algebra. Polynomials, as one might expect, play a significant role in the field of computer algebra. This is because computer algebra is where one can find algorithms for greatest common divisors, factorization, Grobner bases, resultants, characteristic sets, quantifier elimination, and cylindrical algebraic decomposition. Polynomials also play a significant role in the field of mathematics. There are two different kinds of introductions to computer algebra, namely the survey and the fundamental. With the assistance of computer algebra, it is possible to find solutions to issues that arise in fields such as robotics, splines, differential equations, statistics, coding theory, computational chemistry, computer-aided geometric design, geometric theorem proving, and systems of polynomial equations.

These applications, along with a number of others, are described in more depth in the. The bibliographies of these volumes provide light on a vast amount of published material that deals with diverse applications of computer algebra and give this information. How can the applications of polynomial algebra, which were covered earlier in the book, be connected to computer algebra? Those questions and more will be answered in the next section. The branches of the applied mathematics community that place an extremely high premium on their access to computational tools could find the solution to their problem in the books on computer algebra that were discussed before. (This is not yet the ideal answer because textbooks do not always fully use the language of abstract algebra, and even the ones that do sometimes make too many assumptions or require a steep learning curve.) this is not yet the ideal answer because [t]he textbooks do not always fully use the language of abstract algebra. However, in many different fields of applied research, computational approaches are not the major goal. Rather, the emphasis is placed on getting an understanding of the overall structure of the problems that are being researched. When faced with challenges of this kind, the language of algebra may prove to be of tremendous assistance. Because of this, the discipline of applied mathematics need to presumably give some thought to how it might provide its students better access to algebra.

OBJECTIVES OF THE STUDY

1. To study of the Equal Rights to Education
2. To study of the Mathematical usage of algebra and it's importance

In spite of the fact that It certain of the significance of abstract algebra, I do not believe that it is essential for all practical mathematicians to have familiarity with this area of study. Permit me to begin by offering some reflections on the role that mathematics plays in each of the situations described in the first four bullet points. Abstract algebra is a subject that practically all undergraduate mathematics majors are obliged to take as part of their curriculum. Despite the fact that this seems to have resolved the issue for these students, It feel it necessary to point out that classes of this nature almost never discuss modules in the

United States, and when they do, they typically do not spend a great deal of time discussing polynomial rings that contain several variables.

Despite the fact that this appears to have resolved the issue for these students, It feel it necessary to point this out (the focus is more on the univariate case). In addition, the high degree of abstraction may create the impression to students whose major interests lie in the application of mathematics that the topic is less relevant to their studies than it really is. In light of this difficulty, certain algebra textbooks put a greater focus on applications (take the most recent case as an illustration), while other textbooks that are considered to be more "pure" include numerous examples of algebra's application, and a limited number contain chapters on Grobner bases. The fact that many applied mathematicians already had previous education in subjects such as physics, engineering, or operations research is, nevertheless, the most major shortcoming of the course. They never come upon anything quite similar to that road. In a graduate-level course in abstract algebra, it is more likely that topics such as modules and polynomial rings in a variety of variables will be covered. Publications aimed for graduate students, such as, sometimes contain sections on Grobner bases. Do you believe that students who are planning to major in applied mathematics would benefit from taking a course similar to this one? Or is it only a prerequisite for the tests that will decide whether or not they are qualified? 2 It is essential that people have a more in-depth grasp of algebra, which adds even another degree of intricacy to the situation.

There is a rising fear, for instance, that algebra textbooks may devote an excessive amount of emphasis to the commutative case due to the increasing prominence of noncommutative structures (such as vertex algebras). This is because noncommutative structures are gaining a greater amount of importance in today's society. Despite the fact that they are covered in the book, there is still a chance that we won't have enough time to discuss topics like Grobner bases. My hunch is that in order for algebra classes to meet the needs of each and every student, there ought to be a greater emphasis placed on examples that demonstrate the usefulness of algebra as a language for describing mathematical objects in both pure and applied contexts. This would demonstrate how algebra can be used to describe mathematical objects in both pure and applied contexts. Because of this, students in algebra courses would be able to meet the standards they need to. However, as was stated earlier, the most significant drawback is that students who are majoring in applied mathematics would never have the opportunity to take such a course unless they were enrolled in a department that offers both pure and applied mathematics.

This is the case even if they were enrolled in a department that offers both pure and applied mathematics. Students majoring in applied mathematics, engineering, or operations research are not likely to come across a comprehensive course in abstract algebra throughout their academic careers. When students with this kind of background try to enrol in abstract algebra at a university that has a department of pure mathematics, it is quite likely that they will be given a version of the course that is geared towards future algebraists. This is because abstract algebra is one of the most important building blocks of algebra. Students may discover that attending specialised courses in areas of applied mathematics is one of the most effective ways to get acquainted with the algebra that is relevant to the subject matter that they are studying. This might be the case. This works especially well in subfields of applied mathematics where it has been shown that the use of algebra has considerable practical utility and where it has an established track record. That was the visionary who launched the very first course of its type and was the instructor for it? Where precisely did the person get the education necessary to understand algebra? In addition, if these sorts of courses wind up being the dominant source of algebra in applied mathematics, we run the risk of limiting the range of applications that may be discovered for algebra. Applied mathematics is a very important and widely-used branch of mathematics. Unanticipated uses of algebra make up a major chunk of its most exciting applications.

This is one of the aspects that adds to the pleasurable quality of mathematics, and it's certainly not the only one. Applied mathematicians may sometimes come to the realisation, as Sederberg did in this instance, that algebra is an essential component of the problem that they are seeking to solve. There are situations in which the tools of algebra are able to solve the problem, and there are other situations in which the language of algebra is able to clarify the issues and structures involved and assist the researcher in concentrating on what is most important. In some instances, the tools of algebra are able to solve the problem, and in other situations, the language of algebra is able to clarify the issues and structures involved (which in turn can generate juicy problems for the algebraists to explore). The question that I have is how precisely did the researcher arrive at the conclusion that algebra is essential?

There are two different conclusions that might be drawn from this situation:

- Have a conversation with a mathematician who is proficient in algebra about the situation. The issue at hand is in the theoretical aspect of mathematics; more specifically, the question of whether or not algebraists are educated to the point where they are able to conduct a dialogue that is understandable with others who are not experts in the field. Given the importance of what is referred to as "technology transfer" in the United States, the issue becomes: how can we increase students' capacities to interact with people whose fields of expertise are quite different from their own?

- Make an effort to bring back some of the math you learned in the past. In addition to the algebra classes and specialised courses that were discussed earlier, applied mathematicians might also be exposed to algebra if certain applied courses made use of the language of algebra. This would be the case if the specific applied courses in question made use of algebraic language. Having another opportunity to practise math as a result of this might be beneficial.

This could take place in a course on applied linear algebra that discusses the numerical and symbolic aspects of the subject, or it could take place in a course on numerical analysis that discusses some topics from Stetter's recent book on numerical polynomial algebra. Both of these courses are examples of the types of situations in which this could take place. The topic of numerical and symbolic parts of the issue are discussed in both of these classes. It is going to be very important for both pure mathematics and applied mathematics to communicate with one another in order for this endeavour to be successful. If there is already a significant amount, then there must be an even greater increase. Since of the nature of the issues and concepts that are presented in this article, readers should take them with a grain of salt because they are just introductory in nature. The fundamental purpose of these questions is to encourage conversations on how algebra may be used appropriately to real-world mathematical problems. I am certain that algebra has a lot to offer that we have not yet made use of, and once our community has found out how to make the most of this great language, we will be able to make better use of what algebra has to offer.

CONCLUSION

The reader should keep in mind that the concerns and ideas discussed in this article are of an introductory nature and should thus be taken with a grain of salt due to the nature of the topics and ideas that are discussed. The overarching goal of these questions is to stimulate discourse about the proper applications of algebra to mathematical issues that arise in the real world. It certain that algebra already has a lot to offer and that it will have a lot to give once we as a group figure out the most effective way to use this incredible language; however, It am also certain that algebra will have a lot to give once we figure out the most effective way to use this incredible language. It has no doubt that if we find out how to utilise this great language in the most efficient manner, algebra will have a lot to contribute to the world. The purpose of this paper is to point out and discuss the various ways in which these differences may interfere with the rights and opportunities of individual students to pursue the education that they want, as well as the various ways in which this may interfere with the need for societies to recruit people to a variety of professions. Additionally, the purpose of this paper is to point out and discuss the various ways in which this may interfere with the rights and opportunities of societies to recruit people to a variety of professions. In addition, the purpose of this paper is to point out and discuss the various ways in which this may interfere with the rights and opportunities of societies to recruit people to a variety of professions. The purpose of this paper is to point out and discuss the various ways in which this may interfere with the rights and opportunities of societies. Analyses have been carried out on the basis of the data from all of the studies that have been described up to this point in order to look for patterns in the kind of subject matter that it appears that various nations place a focus on when teaching mathematics in schools. This was done with the goal of determining whether or not there is a correlation between the type of subject matter that is prioritised and the country in which the schools are located. These assessments were conducted with the intention of determining which mathematical subjects are given the greatest amount of emphasis in the mathematics curriculum of the various schools. In today's world, a working grasp of algebra is necessary for entry into a diverse range of professional fields and fields of study.

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