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# Mathematics: Usage in, Multidisciplinary Sciences and, Everyday Life What the World of Work tells us

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*Abstract -* The use of mathematics in everyday life often goes unnoticed by the person who exploits mathematics and also by the person who associates with the person who exploits mathematics. This article looks at mathematics as a discipline and it serves to inform people, in general, about the importance of mathematics in the world we live in and how in many ways, human beings have contributed to its sophistication in the application and working worlds.

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# Mathematics: Usage in, Multidisciplinary Sciences and, Everyday Life What the World of Work tells us

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*Abstract -* The use of mathematics in everyday life often goes unnoticed by the person who exploits mathematics and also by the person who associates with the person who exploits mathematics. This article looks at mathematics as a discipline and it serves to inform people, in general, about the importance of mathematics in the world we live in and how in many ways, human beings have contributed to its sophistication in the application and working worlds.

How many of us ever ask questions pertaining to the importance of mathematics? And how many of us ever commend our friends or neighbours work, or comment on the pivotal nature of their work to the world at large? If you ask me, I would think that very few of us ever do. I believe that the nature of mathematics has become more complicated over the decades by ourselves, by making new discoveries and conveying them to the world. However, although this is true, the dissemination of such innovations and discoveries is mostly only noted in the academic environment. I mean, the ordinary guy on the street, wouldn't even know that mathematics journal articles even exist. A shoe maker may apply mathematics when cutting the sole of a shoe, but he himself is unaware of his importance and is not blinded by reality mathematics. This article takes on a conservative yet mature approach and speaks about mathematics and how we cannot live without it.

From the time we are born, our whole life is programmed in numbers. Our age, is the clock that governs what and when things should be done. Our last breadth on Earth is also numericalised, but we know very little about this. And then there is also adulthood, a time when one decides to get married, have children and leave home. This entails buying a house or building one. Architects utilise mathematics in plan drawing of houses and big industrialised and commercialised buildings. They utilise mathematics from an artistic perspective and use the vision of an artist to create something that suits a person or prospective company or business. The mathematics that is used by architects utilises equipment that is similar to those used by a technical drawer. The t-square, set-square, ruler, protractor and compass, all used in geometrical and analytical mathematics, are used on a larger scale. In addition an architect utilises the knowledge of geometry to understand the landscape of a place and to devise a way of fitting a property, of the clients wants, in that space. However, just like how a graphic designer or fine artist creates 2-dimensional and 3-dimensional pictures, an architect does the same but to create something at a larger scale. While a cartoonist, create frames of accurate precision,

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specifically when producing 3-D animation, an architect is precise in a 'concrete' sense. However, just having a plan, as we all know, is not sufficient for one to build a life for him/herself and so the next step would be to build the house.

Someone who has a working knowledge of angles and analytical geometry is required to analyse the plan drawer or architects drawings. Such specialists are generally termed structural engineers. However, for smaller jobs, like the building of smaller houses for example, the term 'builder' comes to mind. By simple definition the term 'structural engineer' is someone who is able to build a particular structure but who is not only confined to building that structure. By this I mean that a structural engineer could by all means be a civil, electronic and electrical engineer. The first and last types of which are pivotal in the building of major commercialised properties and road structures. However, in all types of engineering, a certain degree of mathematical sciences is employed. This could be statistical, physical and even actuary.

In the building of a property (in general), the mathematical knowledge of the structural engineer is highly competitive in the sense that by using his working knowledge of geometry, and basic arithmetic, he has to make decisions as to whether the suggestions given by the land surveyor are correct and feasible. Say, for example, that the plan drawn by the architect shows that the property needs to have a 6 meter yard space in front followed by the building itself, but there is some major underground piping from the point the building needs to be started, then in this case, the structural engineer would have to make mathematical suggestions and recommendations to the plan drawer and second it by the land/building surveyor. The recommendations normally include the angle at which the building would have to be positioned relative to the piping structure. Using this recommendation, the plan drawer would make the relative changes and submit it to the to-be owners of the unbuilt 'structure'. This shows how mathematics has become sophisticated by the sharing and transfer of mathematical knowledge between the architect, structural engineer and surveyor. The purpose of a surveyor is to inspect the landscape or building so as to ensure that all the conditions are optimal to perform a certain action, in a particular area for example. However, it is imperative to note that the job of a structural engineer (builder) is complicated since they use a number of non-mathematical instruments to achieve a 'mathematical' outcome. However, two mathematical instruments that are used are the leveller and in some cases the t-square. In some instances, the land surveyor may request that more intricate instruments are used to flatten the land surface before a trench can be made. Such instrumentation is made using physical mathematics so as to get the desired product design. A good example of the use of physical mathematics is when someone wants to affix a large structure on a huge property. Such structures are usually levitated using cranes and pulleys which requires a working knowledge of physical mathematics, geometry and analytical geometry. This ensures that the weight of the object to be offloaded does not exceed the strength of the suspending rope and that the crane itself is at a specific angle to the rope which is perpendicular to the suspending object. This shows synchronisation between physical mathematicians and structural engineers. The sad situation is that fewer and fewer matriculants, particularly, in South Africa, are failing to pursue careers in mathematics before of its constant and consistent advancement year after year.

However, lets return back to building our house structure. Once the trench for the house is built, the next step is that the structural engineers (mostly builders though) start by laying down the bricks. Although many of us view this to be 'a piece of cake', in actual fact it is not because the bricklayers themselves need to be very accurate to ensure a solid building structure. For example, say a bricklayer is standing within a box structure and is laying bricks for one side of the wall; he needs to have the mathematical knowledge to

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make sure that all four 90o angles are met while bearing in bind which bricks should interlock, where and why. This would ensure that the building structure is solid, safe and secure, creating a home. The principle to building larger properties, aircraft and even ships are the same, as was that of Moses Mabida stadium in South Africa.

Well, and of course once the married couple moves into their new home, they would want to start a family and look for better jobs in hope of securing brighter futures for their children. The couple will then have people plaster the walls of their new homes, paint or renovate the newly wedded structure. And one day, one of the parents would need help to find the reliability of some mathematical answers out at work or perhaps one of their children may need help to check the reliability of a scientific or engineering problem at school of university. All I can say is that this is where the help of a statistician comes in.

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A statistician is a person who is able to perform a range of statistical tests to check whether a research question is valid or invalid. The statistical tests performed usually takes on 3 forms, namely: the difference between samples test, the relationship and trend amongst samples test, and the best of fit amongst samples tests. The type of test performed depends on the data which a person presents the statistician with. The outcome of the result will determine if the results of the experiment performed is reliable, if the experiment has to be performed again, and possibly, if the research question has to be change to suit the type of data ascertained from the study. For example, say you are performing a test on digestive coefficients on cane rats and you are interested to see if there is a difference amongst the eating consumption rates amongst rats of the sample species and weights. From your study you obtain results that support your null hypothesis of there being no difference amongst the consumption rates. This essentially means that the research questions and predictions should be changed so that the null hypothesis is rejected, as in most scientific investigations. Alternatively, also perhaps you should try to check is there is a relationship or trend amongst the consumption rates especially since the rats used in the study all have the same weight and are of the sample species. If the weight of the rats where different and were of a different species in this case, I would opt for a difference test. Therefore it is very important to consider the variables of a scientific investigation, closely, before a statistician is consulted or a statistical test is performed. This highlights the importance of statisticians as number lovers in todays world.

However, we must not forget that the mathematical knowledge gained by architects, structural engineers, physicists, surveyors and statisticians, were first acquired from mathematical textbooks and television content. There are very few self-taught individuals in the fields I have mentioned above today and those individuals possibly have distinguished themselves in these fields. These individuals gained perspective into their careers by understanding the mathematics presented to them in books and tv, and this was only possible because the people behind such texts and programmes were well versed in mathematics. Furthermore, the editors are obviously qualified proficiently to produce such contributions that can be studied by individuals (i.e. students and the general reader). In close association with math textbook editors and math television content editors, are the mathematics opinion researchers who are also versed enough in the field of mathematics are the contributing to. I strongly believe that these 3 mathematic specialists are, probably, the only 'powerhouse' by which the entire sphere of mathematics rests on. Therefore we should have respect for such esteemed individuals.

In addition to the architects, structural engineers, physicists, surveyors and statisticians, in order for a home or company to be safely secured, actuaries, are required. An actuary is a person who has studied accounting mathematics and who is proficient enough to calculate insurance risks and premiums. This means that say for example your

home or company is robbed, an actuary within a particular insurance company can help you claim the value of the insured goods or content of the home or company. However, in everyday life, there are many different types of actuaries, some work in companies that specialise in law, life insurance, car insurance and many others.

Financial lawyers and advisors also require a basic mathematical knowledge to perform their role in legal matters. However, the amount of mathematical knowledge utilised by them is minimal compared to learners of mathematics in school or university. Accountants, on the other hand, require complicated mathematics of arithmetic nature to perform the basics like bank reconciliation, invoices, financial statements, cash receipts journal, cash payments journal, ledger accounts etc., however, they do not require analytical mathematics, and geometry i.e. no scientific mathematics.

In countries like Japan, China and in various cities of the United States of America, seismologists play a pivotal role. Their roles include communicating with climatologists and reporting important information about earthquake tremors to the communities in those countries and the world at large. A seismologist requires a level of mathematics to make comprehensive deductions about earthquakes and therefore they are important in recording historical information about earthquake disasters. The information supplied by seismologists will have an impact on the information gathered by our children from textbooks and television programmes, possibly in the future, and seismologists, mathematics opinion researchers and editors of textbooks and television programmes are thus very important.

As mentioned previously, surveyors are essential people in building property including ships and aircrafts. A navigator who is steering a ship out at sea for example, will require visual mathematics to make judgements without using any equipment. This becomes extremely important especially in the case of an emergency when the navigator has to make a quick indication of the correct route that the ship should be steered into. In this scenario, the pilot does not require the use of textbook mathematics, but instead his eyes have to be trained to judge timing, distance and speed of the ship from a particular thing (object or obstacle) in order to put the ship on the correct course route.

In the United States, Navy Officers, use hearing mathematics to locate objects like submarines. They achieve this by using an underwater radar that sends and receives sound pulses. In addition, people utilise mathematics in businesses as well, as we know. For example, costing managers, require the familiarity of statistics to determine if the business will benefit if they continue to purchase a particular product from a particular company or not. In many ways, a costing manager is similar to the person who runs a household. The difference is that the person who runs the household does not use statistics but common sense of mathematical judgement. In many ways, if one thinks about it, the costing manager as well the the person who runs a household are the key players in sustaining the economy. However, in order for a business to survive on its own, production managers with an in-depth mathematical knowledge of basic and accounting insight, are key role players in making available resources that are needed and utilised by the general public. For example, to build a fully functional house, the various components of the house require highly specialised equipment to make roof tiles, light bulbs and steel pipes for water for instance. The production manager will ensure that the product supplied to shops for sale to the general public conform to a specific standards and that by supplying the product which the public is in demand of, the business will prosper on its own.

In the world that we live in, we are surrounded by mathematics. In South Africa, from time to time, there are land inspectors who come to check if house properties are built and boundaried according government rules and regulations. These land inspectors have a basic idea of mathematics and are able to tell if something does not conform to standards.

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## Conclusion

In South Africa, still a developing country, there are presently many challenges that face society. One of the major challenges is that school finishers pass mathematics and the physical sciences at the lowest percentages compared to their other subjects and fail to gain admission into universities. Very seldomly, but possible, few students with a keen interest in pursuing mathematics at the tertiary level, do pass mathematics with high percentages, but the guarantee to enter university is blur due to space limitations.

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I believe, just like people in many other countries, that society is blinded by the true value of mathematics in the sense that people don't realise that mathematics, if not completely, is probably one of the most important sciences in the world and it integrates itself into our daily lifestyle as well as in other sciences like biology, accounting, engineering, climatology and many other sciences that are aligned or divergent to or of itself, respectively. As can be seen from this article that, from birth to death, mathematics will play an integral parts of our lives. Money management, whether for ourselves or our or other businesses, will ultimately deter how we live our lives and the outcome of our lives. From this article, the usage of mathematics in multidisciplinary sciences and everyday life is told from a working perspective of mathematics (its application) within a variety of independently related scientific fields. However, the examples in this article have been written using the notion that the reader will grasp an understanding of mathematical importance to mankind and civilisation. Image having electronic engineers without mathematics. Can you image being a human being without mathematics being at the center of your existence? Can you picture farmers sowing seeds in fruit and vegetable plantations? So now I am sure that you agree that we would not exist without mathematics having the power to explain the things which other sciences fail to explain. Hence drawing a picture of houses cannot bring itself to reality without mathematics. Physicists and structural engineers will not communicate without plan drawers and architects. The land we live on, will not be surfaced for our feet to walk on. And everything we know about mathematics will be forgotten if mathematics textbooks and television programmes, we unreliable.

Mathematics as a science, is not a core subject, but it can be considered important when integrated into other subjects. I recommend mathematics to the general reader and public and I strongly encourage the children of tomorrow to have a working knowledge of mathematics. I believe that applying mathematics and understanding when we are applying it is just as important as getting ready to start work or going to school. I am not sure if everyone agrees, but mathematics can be used in the academic environment to teach and educate others, students and the less fortunate. Also, we need to start making people aware about the importance of mathematics in the outside world, since we use mathematics in everything that we do. For example, restaurant use mathematics when cooking and baking for customers so that the finances within the business is regulated each month. People are blinded by such, because they are often unaware of how mathematics is used in the real world. I speak to many people daily and they always say that they don't see the need to study mathematics and physical sciences. We need to get out of this negative notion that the world will still exist without mathematics, because we can see that from this article – it won't. We need to educate ourselves and others about the things we do and their relevance when we do them. I hope this article helps to understand how important mathematics is and just how important the people who work in this field are. Nevertheless, we should remember that there is a wider range of careers that that utilise mathematics and that are important to this world.

## References Références Referencias

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