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Mathematical Education and Its Past

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Abstract

Robert Recorde published The Grounde of Artes in 1543, the first math textbooks to be published in both English and French for the general audience. However, the first pieces of writing on mathematics and mathematical operations date to about 1800 BCE. Most of them were found in Mesopotamia, where the Sumerians created a mathematical society that included multiplication and division. They have artefacts that show how they approach problems like the quadratic equation. Two of the most well-known papyri on mathematics written by the Egyptians after the Sumerians are the Rhind Mathematical Papyrus and the Moscow Mathematical Papyrus. The more well-known Rhind Papyrus, which has an estimated date of 1650 BCE, is allegedly only a duplicate of a scroll from a far earlier period, according to scholars. It is plausible to assume that this papyrus served as the primary educational resource for pupils in ancient Egypt. By the seventeenth century, mathematics had a growing academic reputation thanks to the establishment of the Mathematics Chair at the University of Aberdeen in 1613, the Geometry Chair at Oxford in 1619, and the Lucasian Chair of Mathematics at Cambridge in 1662. The Industrial Revolution caused a huge influx of people into cities in the 18th and 19th centuries. This new urban way of life emphasised the need of numeracy by making it necessary to be able to tell the time, count money, and do basic mathematical operations. Beginning at an early age, math was prioritised throughout the new public education systems.

Keywords:*Mathematics,Education,Past Years,Education system,Geometry*

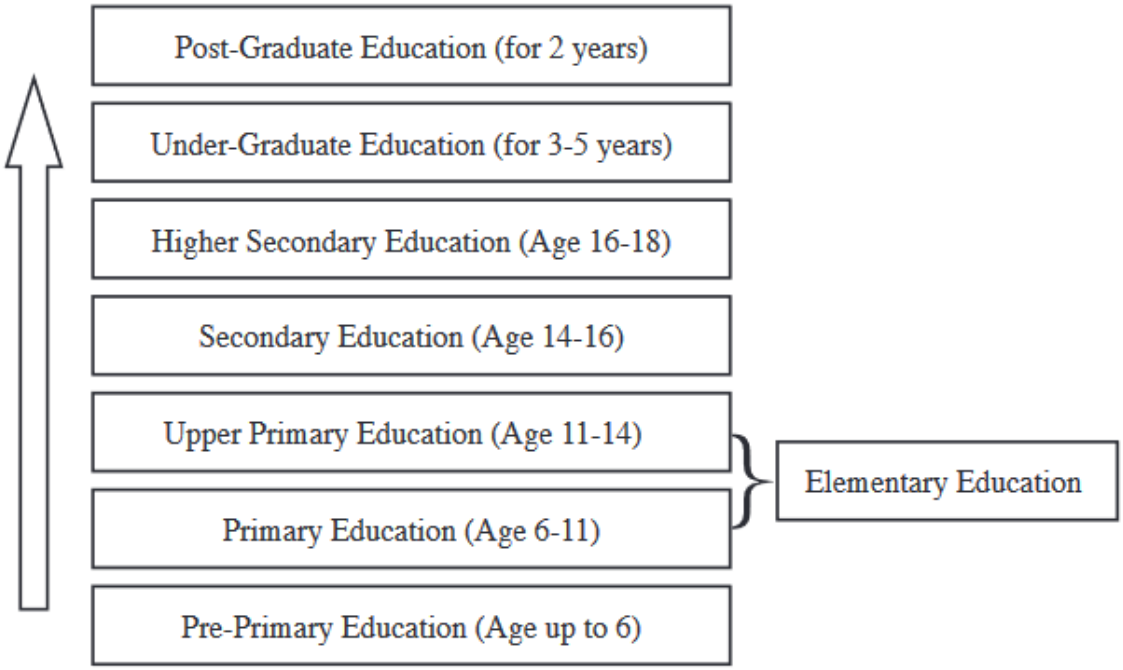
Introduction

The amount of money a nation is willing to invest in its children's education is often an indicator of how progressive and prosperous it is. Science education is frequently considered as society's investment in the future that has yet to be envisioned, therefore it stands to reason that this may be their greatest hope for a bright future. Presidents and prime ministers often warn people that the next generation must be ready to face the challenges of the "new economy." As the mathematical foundation for the information economy of the twenty-first century, modern civilizations place a

premium on math education for the general populace. Simultaneously, proficiency in mathematics is seen as a difficult asset to develop. India has a rich tradition in mathematics, thus the rest of the globe may turn to its graduates for inspiration. This may not be the case, however, considering the pervasive nature of India's socioeconomic problems and the challenge of achieving educational equality for everybody. Nevertheless, despite the odds, India has produced mathematicians of the calibre of Ramanujan and Harish-Chandra. All together, it makes for an interesting picture. Instead of worrying about what the international elite want, one should focus on what the people of India want. To many in this largely poor town, education represents their best chance for a better life (by any measure). The poor, whether they are illiterate or just learning to read, see mathematics as the logical home for the teaching of life skills such as "calculating," "estimating," and "predicting," all of which they believe education should (and, in most cases, does) provide. Many Indian adult education initiatives have shown this to be the case. Again, it's disappointing that these skills aren't emphasised in classrooms.

Structure

The educational system in India is segmented into several developmental phases, beginning with pre-primary and ending with post-graduate education. Education at the elementary level, which includes both primary and upper primary, is managed independently from education at the secondary level, which includes higher secondary education. The standard length for an undergraduate education is three years, whereas professional degrees often take between four and five years to complete. The administration of universities is centralised while still taking place inside the state, and undergraduate education is provided via a network of institutions that are linked with the universities. The Indian education system is governed by the Ministry of Human Resource Development, while each state's government is in charge of its own Education Ministry. Additionally, there is a Central Advisory Board on Education that serves as a forum for communication and collaboration between the centre and the states (as well as between the states themselves) (as well as between the states themselves) (as well as between states). There are a total of 43 Boards of School Education around the nation, and these organizations are responsible for developing curricula, educating teachers, and issuing credentials. However, with the exception of the Central Board of Secondary Education, for which it establishes curricula, the National Council of Educational Research and Training (NCERT) is the apex organisation for curriculum-related topics for school education. Its function is mostly consultative vis-à-vis the other Boards of education. At the level of the universities, each university is responsible for developing its own curriculum, although the University Grants Commission oversees the administration of these programmes. There is a flourishing Open University system, in addition to the National Institute of OpenSchooling, which both work toward the goal of providing access to education by removing possible hurdles imposed by these firms.



Although mathematics was acknowledged from an early period as a crucial component of any education, viewpoints differed. The Zakir Husain group examined the problem from a labour perspective in 1937. The National Policy on Education from 1986 said that formal schooling should "educate a youngster to think, reason, analyse, and articulate clearly." Regardless, mathematics classrooms have looked the same for the better part of 50 years. The pace at which mathematics is taught in schools throughout India has increased dramatically as a direct outcome of worldwide curricular trends. For example, calculus, which was exclusively taught at higher education institutions thirty years ago, is now taught at the upper secondary level. Conversely, projective geometry is mostly missing from modern-day classrooms. Even while there is evidence of the impact of computer science and other contemporary fields in the course mix that is offered at the undergraduate level, the core curriculum has remained relatively unchanged for the most part. One consistent source of tension is the fear and discouragement that accompany mathematical endeavours. The extensive use of process and the pressure of Board tests and entrance examinations for admittance to prominent universities have fostered a culture of intensive competitive preparation among the urban elite. So, this culture has been bad for mathematics in a significant sense. However, if there are topics that consistently have the highest number of failures, mathematics is one of them across almost all Boards. It's sometimes called the "killer" subject since so many kids fail it or give up on elementary school altogether because they can't keep up with the material.

The major challenge

We have identified several issues, but if we were to choose one as the most pressing, it would be the shortage of qualified math educators. Among the many issues we've brought up, if one were pressed to pick out the most critical one, they may say The data is available at the primary level, but not the accompanying knowledge of mathematics, positive attitudes about the subject, or insight into the ways in which students learn (or don't learn) the subject. Unfortunately, the

availability of numerical data is not accompanied with an appropriate mathematical background or outlook. India's socioeconomic inequalities and its under-resourced rural schools need a higher degree of knowledge among the country's teaching staff than is typical in countries with more income and greater democratic representation. This calls for the development of novel approaches to teachers' continuing education. The sheer number of other players at the higher tiers might be intimidating. Considering that universal education may be a realistic possibility within the next decade, the existing pool of teachers is woefully inadequate to meet the standards. The need for more rigour and depth in one's mathematical comprehension and practise is becoming more essential as a result of the numbers. The most urgent need in India's contemporary mathematics environment is probably the development of systematic approaches to achieve excellence in teacher preparation.

Greece and the Roman Empire: the Quadrivium

There is some speculation that mathematical education as an area of pedagogical research and practise may trace its roots back many millennia. Socrates was able to use skillful questioning to steer a slave boy to the realisation that the size of a square that is positioned on the diagonal of another square is comparable to twice that of the smaller square, as described in Plato's Meno, which takes place in the fifth century BCE . In the city-states of ancient Greece, theoretical mathematics and practical arithmetic were kept rigidly separate on both an epistemological and a social level. arithmetic theory was considered more important. As a result, this gave rise to the field of pure mathematics. At this time, the groundwork for the early incarnations of a certain kind of general education was established. The boys from the upper socioeconomic strata among the free citizens received some fundamental schooling, which included arithmetic. After that, they had the opportunity to study with a concentration on rhetoric, or they may pursue an education that was more philosophical and scientific. In contrast to the training that was provided for the highly esteemed profession of scribe in Mesopotamia and Egypt, the training of practitioners, such as land-surveyors, was left up to the individual initiative of the practitioner or to the organisation of the particular professional group. This was the case in both Mesopotamia and Egypt. It is generally agreed that Euclid's Elements, which was written about the year 300 BCE, was the most important mathematical treatise and mathematics textbook of antiquity. Euclid's Elements was written by Euclid. To the best of my knowledge, it has been issued in a greater number of editions than any other piece of literature, including the Bible. In his work "The Elements," Euclid is credited for deducing, from a very basic set of axioms, the essential principles of what is now known as "Euclidean geometry." Euclid resided in Alexandria, which is today in Egypt. Euclid's accomplishment was to compile all of these ideas into a single, unified, and coherent structure, which made them much easier to apply and refer back to. This framework includes a system of numerous mathematical proofs, which is still used today as the basis for mathematics and serves as the cornerstone of mathematics. The Elements was the principal textbook for teaching pupils mathematics, especially geometry, from the time it was published until the later half of the nineteenth century or the early part of the twentieth century. This was the case from the time it was published until it was published. When the Roman Empire was at its peak, it adopted and improved upon many of the key features of the Greek and Hellenistic educational systems. The seven liberal arts were initially defined by Plato (424/423-348/347 BCE). The trivium was designed for oratory

training, whereas the quadrivium was meant to determine who would go on to study mathematics (in its four forms: number theory, geometry, music theory, and astronomy). At the close of Classical Antiquity, these areas of study were categorised as the seven liberal arts. These liberal arts are meant to be the counterpoint to the traditionally undervalued mechanical arts. Neo-Pythagorean Nicomachus of Gerasa lived between the years 60 and 120 B.C. Until the eighteenth century, his ideas from his textbook Introduction to Arithmetic (Arithmetike eisagoge) were widely used in European arithmetic curricula. The ideas of Nicomachus were first brought to the educational system of mediaeval Europe by Boethius, a Roman philosopher who flourished from around 480 to 524 or 525 CE. De institutione arithmetica libri duo, his translation of Nicomachus's work on arithmetic, was a crucial element of the mathematical education accessible to people in the Middle Ages. In his writings, Nicomachus asserted that one could not represent the number one as a polygon. Boethius's translation muddied this meaning, leading to the false idea that one was not a number. This falsehood was spread widely by early modern authors.

Middle Ages

When it comes to applying for administrative posts, the Chinese government was the first in the world to insist that prospective employees take official, high-stakes examinations. Nearly seven centuries after their inception, these tests were systematically organised in the ninth century. All the subjects covered by the exams have comprehensive guides and tutorials readily accessible. The Jiu zhang suan shu, also known as the Nine Chapters of Calculation, are especially important to the study of mathematics since they were included in the first official list of textbooks allowed for the preparatory training that followed from these tests. With the rise of the Frankish Empire, education improved throughout Christian Europe during the Middle Ages. Schools associated with monasteries taught some of the seven liberal arts; nevertheless, with an eye on the future careers of priests, the computus, or the basic astronomical knowledge necessary to calculate the calendar for the holy festivals, was the major focus of mathematics teaching. The Propositiones ad Acuendos Juvenes, or Problems to Sharpen the Young, is a Medieval Latin work that contains some of the first collections of recreational mathematical problems. It is often believed that Alcuin of York (735-804), an English scholar and teacher from York, Northumbria, wrote this work. He was asked to be a leading scholar and teacher at the Carolingian court by Charlemagne, King of the Franks and Emperor of the Romans. These problems require creative problem solving, but the answers are not constrained by any specific mathematical idea or set of rules . There are several manuscripts from the Post-Classical and Post-Classical eras that include mathematical problems for entertainment purposes; these riddles may have been handed down from one culture to another from one generation to the next.

Place Value Numerical Systems

Gerbert (ca. 955–1003), who would eventually become Pope Sylvester II, wrote extensively to enhance mathematical education in the Christian West. Born in France, he spent his formative years in Catalonia, Spain, where he was exposed to Islamic scientific principles. During their formative years, the Muslims absorbed the scientific knowledge of both the Greeks and the Persians and translated many works into Arabic. Meanwhile, Arab traders and explorers were

making contact with India and China, picking up many of those nations' novel ideas along the way. Despite Gerbert's limited understanding of the Hindu-Arabic numerals, it was owing to him that they were first introduced to the Christian West. However, he clearly did not since he neglected to include the number zero and the appropriate agorithms for calculating these totals. In the 12th century, there was a zenith of interaction between Jews, Christians, and Muslims throughout Europe and the Mediterranean. The Islamic world's influence was waning as the other two regions strengthened (Katz, 1993). In the twelfth century, readers were enthusiastic about works by Greek authors that had been translated by Muslims into Arabic and Latin. The dissemination of the decimal place-value system via educational channels was greatly aided by three works. "Carmen de Algorismo" is a hexameter poem written by Alexander de Villa-Dei. The poem was extensively read and even translated into popular tongues like French and Old Norse despite its tiny length (only a few hundred words). The rationale and practise of using the new Hindu-Arabic numerals, which Villa-Dei termed Talibus Indorum, are summed up there. The earliest known literary usage of the zero in Europe. Another important literature prepared for use in mediaeval cathedral schools was Algorismus Vulgaris by Sacrabosco. The origin of the third part is unknown. Fibonacci, or Leonardo Bonacci Pisano, produced Liber Abaci, a detailed explanation of the Hindu-Arabic numeral system. The book's popularity is shown by the abundance of manuscripts dedicated to it. This book demonstrated how the new number system and calculation methods may be put to use. Numerous topics related to accounting for businesses were discussed. Despite the fact that the civilizations of the Eurasian continent maintained channels of communication with one another, other civilizations, such as those in the Western Hemisphere, developed their own systems of mathematics that were not acknowledged by their Eurasian counterparts until much later. The Mayan civilization flourished in what is now Mexico and the surrounding area between the third and ninth centuries. There was also a handful of priests among them who were very skilled with numbers. On one level, their place value system was twenty-based like ours. The Inca civilization flourished in what is now Peru and the neighbouring areas from from 1400 to 1560. They employed a systematic system of numeration to keep track of the knots and chords used in quipus (Katz, 1993). Although other societies undoubtedly produced their own unique body of mathematical knowledge, unfortunately, due to their final extinction, these advancements are now gone. Knowing how to convert between different units of weight and measurement, as well as how to calculate interest, are just a few of the numerous applications where such knowledge might be useful. In addition to having a profound impact on the growth of European philosophy, the book was also a huge hit among Europe's intellectual elite.

The Renaissance and the Abbacus Schools

The first Western European universities opened in the 13th century, marking the end of the Middle Ages. Those who could afford it came from all across Europe to study there, whether it be law, medicine, or theology. Students at the pre-university Faculty of Arts learned about the seven traditional disciplines. The quadrivium lectures were supplementary, presented as "extraordinary," whereas the trivium formed the backbone of "ordinary" . The range of available occupations expanded beyond farming and herding to include industrial and commercial work. Masons, merchants, and moneylenders, to name a few, might expect their apprentices to get training in the amount of practical mathematics required by their respective industries. Students interested in

learning commercial arithmetic often didn't attend to universities, where mathematics was taught as part of the quadrivium under the influence of scholasticism, but instead sought out a counting master, a man well-versed in the arts of commercial computing, to learn from. They were referred to as maestri d'abbaco in Italy and Rechenmeister in German-occupied areas. There was a quick expansion of "reckoning schools" in Europe's commercial hubs and along the continent's major trade routes as a result of these professionals' willingness to teach others their craft via individual lessons and organised courses. This trend began in Renaissance-era Florence and spread to other northern Italian towns like Milan and Bologna. From its origin in 14th-century Florence, the scuole d'abbaco, or "reckoning schools," disseminated to other cities and provided instruction in the advanced mathematical calculations used in international trade. Since the Near East was a crucial market for Italian traders, it stands to reason that they would have been curious in the Arabs' approach to mathematics and accounting. The extensive use of Arabic numerals, first documented among Italian merchants in the thirteenth century, was probably a consequence of their strong interactions with the Arab world and the new needs produced by their more complicated commercial structure. As new ways of doing business emerged throughout the commercial revolution, a new mathematical system was required. The Arabic system was the right fit . In 1265, the first known abbacus instructor gave lessons in Bologna, Italy. Many other cities throughout Italy, from Umbria and Tuscany in the south to Genoa, Lombardy, and Venice in the north, also produced abbacus masters during the following four decades. From the 1280s on, records of masters being paid by city communes appeared, mostly in smaller communes. There was apparently no need for a public effort in Venice and Florence. Many Florentines left Florence to teach in other cities as their own educational system became widely regarded as the greatest . In 1343, there were six abbacus schools in Florence, and the city maintained an average of three or four such institutions from the early decades of the fourteenth century into the sixteenth century, and perhaps beyond .

Conclusion

Students in mathematics history classes are working toward a number of goals, the most significant and widespread of which is likely to be an understanding of the development and history of mathematical concepts that are fundamental to the mathematical education of all of the students in the class. Students will be able to get a more profound comprehension of the mathematical ideas that they are currently learning if they have this knowledge. Understanding mathematics as an important and central human endeavour, which is motivated just as much by human curiosity as it is by practical application, should be emphasised in mathematics history classes. This is because mathematics is a human endeavour that is both significant and central. These classes need to address (a) the connections that may be made between culture and mathematics, and (b) a brief biography of each of the human beings who are credited with inventing (or discovering) mathematics. At the end of the day, they should include some level of thinking as well as understanding about the process of how history is written, such as what our evidence is, what makes for great evidence, how our own ideas and world view effect our interpretation of evidence, and so on and so forth.

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