



Establishing the Growth Rate of Mauritian Students' Achievement in Mathematics for the Cambridge School Certificate Examination

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Abstract

As research must measure and precisely assess the effects of changes and advances in an area of endeavor, mathematics has played. It continues to play a key role in developing realms of science and technology. Academic performance is an important factor in determining an individual's success or failure in mathematics. Mathematics is obligatory in Mauritius until students reach Grade 11, taking the Cambridge School Certificate Examination. However, in the case of Mauritius, the question of student success growth rate has not been properly explored. The aim of this research is to establish the rate of growth in student math performance for the Cambridge School Certificate Examination. The Verhulst logistic model is adapted for this purpose for the period 2012 to 2019. According to the findings, the predicted growth rate of student achievement in Mathematics Syllabus A, Mathematics Syllabus D, and Additional Mathematics are respectively lowered by about 2.42 percent, 1.86 percent, and 7.01 percent per year.

Keywords: Education, Mathematics, Achievement Growth Rate, Quantitative Research, Verhulst Logistic Model, Cambridge School Certificate Examination.

Introduction

Mathematics has an impact on our daily lives. Outside of the classroom, mathematics in the form of reasoning and problem solving appear regularly. It is more prevalent in our daily lives than many people realize, and it enables us to thoroughly comprehend the world around us. Mathematics is crucial in making inventions a reality. Many mathematical theories and representations of real-world situations have aided scientists and engineers in overcoming seemingly insurmountable challenges. When you contemplate the educational and professional spheres, mathematics is everywhere.

Academic performance is a significant characteristic that determines an individual's success or failure in mathematics. Academic accomplishment is commonly defined as demonstrating information gained or abilities developed in a school topic (Bossaert, Doumen, and Buyse). Every educational program's goal is to guarantee that pupils attain a satisfactory outcome. This is frequently context-based and is measured by examination or continuous evaluation. However, there is no broad consensus about how it can be evaluated or which components are more important. (Yeung). Mathematics offers the underlying information and abilities for all other academic courses, including science, art, and economics. The mathematical accomplishments of secondary school

students have an impact on their success in a higher education institutions and their career opportunities. Mathematics achievement in secondary school correlates with educational attainment, initial earnings, and revenue growth (Murnane, Willet and Levy).

A strong mathematical foundation allows pupils to acquire nuanced viewpoints and opens them to additional job opportunities. Educators and government officials have consistently underlined the significance of mathematics study (Wilkins and Ma). Teachers and parents will be unable to assist their pupils in making significant academic progress until they know the elements that impact their kids' mathematics success and improvement (Ma and Klinger). However, previously discovered that the accomplishment of all levels of pupils in mathematics has slowed over time (Ahiakwo). A mixed approach was used to investigate the contextualized factors affecting secondary school student's academic performance in Mauritius. (Atchia and Chinapah). The authors established the influence of the factors on student accomplishment while taking learners' academic growth into account. According to the model, school leadership has the most positive link with student accomplishment, followed by student factors, tuition instructor, school teacher, and socioeconomic status.

Mathematics is compulsory in Mauritius until Grade 11, where pupils sit for the Cambridge School Certificate Examination. Students can select between two syllabuses, widely known as Mathematics Syllabus A and Mathematics Syllabus D. Furthermore, based on their mathematics proficiency in Grade 9; some students choose the topic Additional Mathematics. The pass percentage in the Mathematics Syllabus D subject has dropped from 79.03 percent in 2015 to 74.27 percent in 2019. The typical assessment timetable has been modified due to the COVID-19 epidemic, and the 2020 cohort of students is presently being assessed.

With so many creative teaching methodologies, one concerns if there will be a proportional increase in mathematical achievement. However, the topic of student achievement growth rate has not been thoroughly investigated in the instance of Mauritius. The aim of this research is to determine the rate of

increase in academic achievement in Mathematics and Additional Mathematics for the Cambridge School Certificate Examination. This research will help instructors, school administrators, and education officials sustain the subject's achievement progress.

Method

The quantitative analysis methodology was used since the aim of this paper was to measure the level of growth of student achievement in Mathematics and Additional Mathematics in the Cambridge School Certificate Examination. Secondary data was gathered from the Mauritius Examination Syndicate's website (MES). From 2012 to 2019, the statistics comprised the number of students examined and passed the subjects Mathematics (Syllabi A & D) and Additional Mathematics.

Instead of an exponential growth model, a logistic growth model (Tsoularis) is utilized to determine the growth rate of students' achievement (Obasi and Ugo). The reason for this is because the exponential model is impractical due to environmental constraints on population expansion. Setting $N(t)$ as the number of passed students at time t , r as the intrinsic growth or decay rate of student's achievement, and K as the carrying capacity of the number of examined students, then the Verhulst logistic equation is given by

$$\frac{dN}{dt} = rN \left(1 - \frac{N}{K} \right).$$

If N_0 is the number of students passed at time $t=0$, then the Verhulst logistic equation has the following solution.

$$N(t) = \frac{KN_0}{(K - N_0)e^{-rt} + N_0}.$$

Making r the subject of the equation above, we obtain the rate of student achievement growth provided by

$$r = -\frac{1}{t} \ln \left[\frac{1}{K - N_0} \left(\frac{N_0 K}{N(t)} - N_0 \right) \right]$$

Findings

The secondary data gathered from the Mauritius Examination Syndicate's website are summarized in Table 1. We observe that more students opt for

syllabus D as compared to Syllabus A. Further, the pass percentage in the Mathematics Syllabus A subject has dropped from 48 percent in 2012 to 34 percent in 2019. A comparable observation may be made for Mathematics Syllabus D. However, there is a little increase in Additional Mathematics, from 70% in 2012 to 72% in 2019. Similar observations hold gender-wise.

To compute the growth rate for the student's achievement, let $t=0, 1, 2, \dots$, seven correspond to the years 2012, 2013, 2014, \dots , 2019, respectively. Firstly, consider the subject Mathematics Syllabus A. Using $N_0=1514$, $K=5407$, the maximum number of examined over the considered period, and $N_7=1336$, we have $r = -0.0242$. This means that the expected growth rate of student achievement in Mathematics Syllabus A is reduced by roughly 2.42 percent per year.

Similarly, we can find $r = -0.0186$ and $r = -0.0701$ for the subjects Mathematics Syllabus D and Additional Mathematics, respectively. This implies that the expected growth rate of student achievement in Mathematics Syllabus D and Additional Mathematics are respectively reduced by roughly 1.86 percent and 7.01 percent per year.

Conclusion

Mathematics is essential in everyday life and has a wide range of applications. The logistic growth model was used to analyse the growth rate of students' success in the mathematics subject for the Cambridge School Certificate Examination. According to the model, the growth rate for all of the disciplines evaluated was negative from 2012 to 2019. The findings indicate that the future expansion of mathematical achievement seems to be of concern.

Table 1: Examined and Passed Data for the Cambridge SC Examination

Year	Category	Mathematics Syllabus A		Mathematics Syllabus D		Additional Mathematics	
		Examined	Passed	Examined	Passed	Examined	Passed
2012	Boy	1281	574	6474	5211	3850	2375
	Girl	1902	940	7156	5857	3688	2893
	Total	3183	1514	13630	11068	7538	5268
2013	Boy	2342	900	6666	5202	3749	2334
	Girl	2658	1094	7054	5594	3488	2707
	Total	5000	1994	13720	10796	7237	5041
2014	Boy	2374	775	6417	5069	3577	2197
	Girl	2554	848	7158	5502	3388	2703
	Total	4928	1623	13575	10571	6965	4900
2015	Boy	2663	918	6808	5301	3595	2254
	Girl	2744	978	7263	5820	3456	2677
	Total	5407	1896	14071	11121	7051	4931
2016	Boy	2247	840	6653	5078	3449	2149
	Girl	2466	852	7078	5512	3349	2614
	Total	4713	1692	13731	10590	6798	4763
2017	Boy	2210	728	6506	4940	3205	2062
	Girl	2342	787	7367	5675	3298	2539
	Total	4552	1515	13873	10615	6503	4601
2018	Boy	2071	717	6649	4996	3172	2085
	Girl	2188	682	7573	5609	3140	2390
	Total	4259	1399	14222	10605	6312	4475
2019	Boy	1978	691	6615	4973	3077	2052
	Girl	1996	645	7821	5748	3085	2372
	Total	3974	1336	14436	10721	6162	4424

Effective mathematics teaching and learning at all stages of schooling should be assured by all parties involved to achieve a positive growth rate in the subject. The research results educate regulators, educators, and other stakeholders about the thresholds that should be prioritized when implementing relevant initiatives. As future work, the investigation into factors responsible for the negative growth will be studied.

References

- Ahiakwo, M J. *Science, Science Education and Scientific Literacy*. 2006.
- Atchia, Shakeel Mohammad Cassam, and Vinayagum Chinapah. "Factors Affecting Academic Achievement of Secondary School Students in Mauritius." *Journal of Education and Research*, vol. 9, no. 1, 2019, pp. 70-90.
- Bossaert, Goele, et al. "Predicting Children's Academic Achievement after the Transition to First Grade: A Two-Year Longitudinal Study." *Journal of Applied Developmental Psychology*, vol. 32, 2011, pp. 47-57.
- Ma, Xin, and Don A. Klinger. "Hierarchical Linear Modeling of Student and School Effects on Academic Achievement." *Canadian Journal of Education*, vol. 25, no. 1, 2000, pp. 41-55.
- "SC Statistics." Mauritius Examinations, http://mes.intnet.mu/English/Pages/statistics_pages/sc_statistics.aspx
- Murnane, Richard J., et al. "The Growing Importance of Cognitive Skills in Wage Determination." *Review of Economics and Statistics*, vol. 77, no. 2, 1995, pp. 251-266.
- Obasi, Chinedu, and Chima Ugo. "Predicting Growth Rate of Students' Achievement in Mathematics Using Mathematical Growth Model." *Supremum Journal of Mathematics Education*, vol. 2, no. 2, 2018, pp. 44-51.
- Tsoularis, A. "Analysis of Logistic Growth Models." *Research Letters in the Information and Mathematical Sciences*, vol. 2, 2001, pp. 23-46.
- Wilkins, Jesse L.M., and Xin Ma. "Predicting Student Growth in Mathematical Content Knowledge." *The Journal of Educational Research*, vol. 95, no. 5, 2002, pp. 288-298.
- Yeung, Ryan. "Athletics, Athletic Leadership, and Academic Achievement." *Education and Urban Society*, vol. 47, no. 3, 2015, pp. 361-387.

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