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THE ICELANDIC LEARNED SCHOOL AS A SECONDARY SCHOOL IN 19TH-CENTURY EUROPE

Summary: Iceland, inhabited by Norse people since the 9th c., had a population of fewer than 70,000 until the 1870s. Christianity, adopted in 1000 CE, brought literacy and cathedral schools, later reinforced by Lutheran Protestantism in 1550 and special privileges for Icelandic students at the University of Copenhagen. European secondary schools in the early 1800s placed increased emphasis on mathematics, sciences, and modern languages, modelled on the French *lycée* and Prussian *gymnasium*. In Iceland, the sole Icelandic secondary school could adapt to these changes due to the mathematician B. Gunnlaugsson, educated at the University of Copenhagen and trained in geodesy. By the 1870s, schools in the Danish school system were divided into a languages-and-history stream and a mathematics-and-science stream. However, the Iceland's school was too small to split, there was no strong person to defend the study of mathematics, and a proposal to run a combined stream was rejected. A mathematics stream was only established in 1919.

Keywords: Iceland, mathematics education, secondary school, gymnasium, Björn Gunnlaugsson

Introduction

Iceland is an island in the North Atlantic Ocean, situated on the Mid-Atlantic Ridge, where the Eurasian and North American tectonic plates meet. Its nature is shaped by volcanic activity, earthquakes, and geothermal energy, along with the interplay of warm Gulf currents and cold polar currents, creating fertile fishing grounds. These environmental factors contribute to a relatively habitable country despite its latitude.

Iceland has been inhabited by coastal communities since the 9th c. Originating in Norway, Icelanders maintained contact with European culture despite the distance from Europe's mainland, separated by an ocean where sailing was seldom risked during the winter months. Christianity, adopted in 1000 CE, promoted literacy through cathedral schools, primarily established to educate clergy. The cathedral schools evolved with the rise of Lutheran Protestantism in 1550, which emphasized the education of common people[1]. In German countries, Protestant towns established schools, *gymnasia*, and mathematics began to gain prominence, though initially limited to arithmetic. The focus was on a classical program, developing from the cathedral schools[2].

The 19th c. brought significant social and political changes to Europe, including secularization and the growth of the middle class. By the early 1800s, secondary schools emerged as public, secular institutions, focusing on university preparation, with a predominantly classical curriculum, taught by specialist teachers trained at universities[3]. Former cathedral schools were transformed into secular, state-organized schools, modelled on the Prussian *gymnasia* or the French secondary schools, *lycées*. The French *lycées*, established by Napoleon in 1802, were based on Latin and mathematics as the two major disciplines. The *gymnasia* were renovated around 1810. Their core curriculum prescribed three major disciplines: classical languages; mathematics and sciences; history and geography[4].

Theoretical framework and research question

This paper addresses the following research question: What circumstances in a sparsely populated, isolated island like Iceland allowed for the development of education, particularly mathematics education, on par with other European nations?

The framework follows Mogens Niss's statement[5] that, in essence, mathematics education serves three purposes:

- Technological and socio-economic development of society.

[1] G. Karlsson, *Iceland's 1100 Years. The History of a Marginal Society*, C. Hurst & Company, London 2000.

[2] G. Schubring, *Mathematics education in Catholic and Protestant Europe*, [in:] *Handbook on the History of Mathematics Education*, ed. by A. Karp & G. Schubring, Springer, New York, Heidelberg, Dordrecht, London 2014, p. 130–143.

[3] R.D. Anderson, *The Idea of the Secondary School in Nineteenth-century Europe*, "Paedagogica Historica" 2004, vol. 40, no. 1–2, p. 93–106.

[4] G. Schubring, *Mathematics Education in Germany (modern times)*, [in:] *Handbook on the History of Mathematics Education*, ed. by A. Karp, G. Schubring, Springer, New York 2014, p. 241–255.

[5] M. Niss, *Goals of Mathematics Teaching*, [in:] *International Handbook of Mathematics Education*, part 1, ed. by A.J. Bishop, K. Clements, C. Keitel, J. Kilpatrick, C. Laborde, Kluwer Academic Publishers, Dordrecht, Boston, London 1996, p. 11–47.

- Political, ideological, and cultural maintenance and development of society.
- Providing individuals with prerequisites that may help them cope with life.

This study explores the necessity of mathematics education for Iceland's economic or cultural development in the context of 19th c. industrialization. It examines its culture's dependence on individuals, showing how only a few cultivated mathematics for its own sake but made an important impact on the country's cultural life.

Iceland's relation to Denmark in the early modern period

Icelanders created their own community by establishing a regular assembly of all free men, *Althingi*, in the year 930 CE, but submitted to Norwegian rule in 1262 under the condition that they would pay taxes and that six ships would sail to Iceland each year. The Kalmar Union (1397–1523) brought Norway and Iceland under Danish rule. In 1602, Danish merchants were granted a monopoly on all trade in Iceland, which ensured consistent contact with Europe, but at the cost of excluding trade with English, German, and Dutch merchants, and with French and Spanish fishermen. Icelanders could only construct small fishing boats from driftwood, lacking suitable timber for larger vessels[6]. Therefore, the ships from Norway, and later the Danish trade, were important channels for communication with Europe. This dependence reinforced Denmark's role as Iceland's gateway to Europe.

In 1579, Icelandic students were granted privileges at the University of Copenhagen, receiving free meals at its canteen, and free accommodation at the *Regensen*, the University's student residence, when it opened in 1623[7]. The intention behind this generous act was possibly to ensure the correct doctrine of Lutheran Protestantism, but it also ensured that Iceland's educated elite maintained ties with European intellectual traditions, with Danish officials playing a minimal role in local governance, as most magistrates and priests were Icelandic. Consequently, Iceland preserved its ancient language and cultural identity.

Formal education during this period was limited to two cathedral schools. Also, several arithmetic manuscripts in private possession have been preserved from this time, some of which were translated from or influenced by North European Lutheran textbooks[8]. In the 18th c., the Enlightenment had a significant impact on modernizing this tiny society. Small handbooks on arithmetic for trade

[6] G. Karlsson, *Iceland's 1100 Years: The History of a Marginal Society,* p. 51.

[7] J. Benediktsson, *Hafnarháskóli og íslensk menning* [The Hafnia University and Icelandic Culture], "Tímarit Máls og menningar" 1980, vol. 41, no. 1, p. 65–77.

[8] K. Bjarnadóttir, *17th and 18th Century European Arithmetic in an 18th Century Icelandic Manuscript*, [in:] *History and Epistemology in Mathematics Education: Proceedings of the 6th European Summer University – ESU 6*, ed. by E. Barbin, M. Kronfellner, C. Tzanakis, TU WIEN Technische Universität Wien, Vienna 2011, p. 615–625.

were published in Danish and Icelandic. Danish authorities made efforts to gather information about the island, including census data on its around 50,000 inhabitants, landholding conditions, and geodetic surveys. Small-scale industries were encouraged through workshops. The Educational Society of Iceland was established to promote public knowledge, publishing journals and books, including arithmetic textbooks[9].

However, in 1783, a huge volcanic eruption and accompanying earthquakes caused a severe setback: the death of livestock, followed by famine; the population fell from 50,000 to below 40,000. This disaster disrupted educational progress, leading to temporary closures of the cathedral schools until a new school was founded in 1805 at Bessastadir (Bessastaðir), in the rural vicinity of Reykjavík[10].

Bessastadir Learned School

The Danish secondary school system underwent reforms of curricula in mathematics, science, and modern languages in the early 1800s, influenced by German educational philosophy[11]. Former cathedral schools in Denmark were transformed from theological seminaries into schools offering general preparatory education for officials. Thus, the organization of secondary education was transferred from the church to the state. The new Danish Royal Directorate of the University and the Learned Schools of 1805 oversaw this transformation. *Latinskolen*, the Latin School, was developed after the Reformation in the 1550s to replace monastery schools. Through reforms in 1805 and 1909, the Latin Schools became Learned Schools[12].

The Bessastadir Learned School, belonging under the Royal Directorate, merged the two Icelandic cathedral schools. It operated as both a theological seminary and a general education institution until 1846, when it moved to Reykjavík and was split into the Reykjavík Learned School and the Theological Seminary. After the cathedral schools' decline during 1784–1805, the Bessastadir School was served by three university-educated teachers, contributing significantly to Icelandic culture. Sveinbjörn Egilsson translated Greek texts, Hallgrímur Scheving compiled Icelandic proverbs, and headmaster Jón Jónsson worked on Bible translations. In the first years, Jónsson taught mathematics: the four operations in whole numbers and fractions. Mathematics gained prominence with the appointment of the mathematician Björn Gunnlaugsson in 1822.

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[9] K. Bjarnadóttir. *Mathematical Education in Iceland in Historical Context. Socio-Economic Demands and Influences*. *IMFUFA tekst nr. 456/2006*, Roskilde Universitet, Roskilde 2006, p. 67–81.

[10] G. Karlsson, *Iceland's 1100 Years: The History of a Marginal Society*, p. 177–183.

[11] P. Heegaard, *Der Mathematikunterricht in Dänemark*, Gyldendal, Copenhagen 1912.

[12] C.M. Jørgensen, *LEX, Danmarks Nationalleksikon. Skole og undervisning efter 1814* [LEX, Denmark's National Lexicon. Schooling and Teaching after 1814], https://danmarkshistorien.lex.dk/Skole_og_undervisning_efter_1814 [accessed 10.05.2025].

Björn Gunnlaugsson: a pioneering mathematics teacher[13]

Björn Gunnlaugsson (1788–1872), a gifted child from a poor family, overcame significant obstacles to study mathematics. He became an assistant to land surveyors of the Danish Army, who gave him mathematics textbooks. Trained at the University of Copenhagen in 1817–1822, and on land surveying with Professor Schumacher in Altona during summers, he wrote to the Danish authorities, stressing the importance of mathematical education and the absence of a mathematical tradition in Iceland. He proposed a teaching position in mathematics at the Bessastadir School and offered to fill the role. His appointment marked a turning point. He developed a robust curriculum aligned with Danish standards and continued teaching there for forty years.

Bessastadir School accepted students aged 13–18 as novices to stay there for six years. The curriculum at Bessastadir School was divided into two classes, a lower class and an upper class, with students spending three years in each. A report from 1824–1825 shows that Gunnlaugsson taught basic arithmetic (whole numbers, fractions, and decimal fractions), algebra, and the extraction of quadratic and cubic roots in the lower class, following a Danish arithmetic textbook. In the upper class, he also had to teach decimal fractions, algebra, and the extraction of roots, as some students were placed in the upper class due to their knowledge of Latin from a private school[14]. Despite the circumstances, Gunnlaugsson could soon develop his mathematics and science curricula in line with Danish regulations of 1818, using Danish textbooks. Gunnlaugsson's contributions extended beyond teaching. He conducted geodetic surveys, producing the first accurate map of Iceland in 1845, which became an invaluable resource for navigation, safety, and national development. His work earned recognition from Danish and French authorities.

Cultural activities

During its period, 1805–1846, Bessastadir School became a centre of culture and education. In 1816, the Educational Society of Iceland was restored as the Icelandic Literary Society[15]. Together, the school and the Literary Society acted as Iceland's Academy. The teachers held open lectures each spring on classical works as well as modern sciences, such as Homer's *Odyssey*, the Norse literary heritage, astronomy, and land surveying (see Table 1).

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[13] K. Bjarnadóttir, *Björn Gunnlaugsson – Life and work. Enlightenment and Religious Philosophy in Nineteenth Century Icelandic Mathematics Education*, [in:] *"Dig where you Stand" Proceedings of a Conference in the History of Mathematics Education*, ed. by K. Bjarnadóttir, F. Furinghetti, G. Schubring, University of Iceland, Reykjavík 2009, p. 17–29.

[14] National Archives of Iceland [NAI], Bps. [The Bishop's Archive] C VII, 3a.

[15] S. Líndal, *Hið íslenska bókmenntafélag: söguágrip* [The Icelandic Literary Society: A Brief History], The Icelandic Literary Society, Reykjavík 2016.

Table 1. Spring lecture series at Bessastadir School.

1828	Some simple rules to explain the path of the Moon	B. Gunnlaugsson
1829	The 1st and 2nd books of Homer's *Odyssey*	S. Egilsson
1830	The 3rd and 4th books of Homer's *Odyssey*	S. Egilsson
1831	Hugsvinnsmál, a translation of an ancient Latin poetry	H. Scheving
1832	A rhyme on Olaf Tryggvason, King of Norway	S. Egilsson
1833	Placidus-drápa, poetry	S. Egilsson
1834	On measuring and drawing the map of Iceland	B. Gunnlaugsson
1835	The 5th, 6th, 7th, and 8th books of Homer's *Odyssey*	S. Egilsson
1836	Tables of the Sun's visible path	B. Gunnlaugsson
1837	Odin's Magic	H. Scheving
1838	The 9th, 10th, 11th, and 12th books of Homer's *Odyssey*	S. Egilsson
1839	The 13th, 14th, 15th, and 16th books of Homer's *Odyssey*	S. Egilsson
1840	The 17th, 18th, 19th, and 20th books of Homer's *Odyssey*	S. Egilsson
1842	*Njóla*, an easy sky examination – contemplation of the cosmos	B. Gunnlaugsson
1843	Icelandic proverbs	H. Scheving
1844	Gamli kanúki (The Old Canon) (12th c.)	S. Egilsson
1845	A guide to know stars – first part	B. Gunnlaugsson
1846	A guide to know stars – second part	B. Gunnlaugsson

Source: *Skýrslur um Bessastaða-Skóla* [Reports on Bessastadir-School], Viðeyjarklaustur, Viðey 1828–1846.

Concurrently, the Literary Society and some individuals published books that were likely to enhance knowledge and education, such as the Sagas, statistical reports, weather reports, and the journal "Skírnir", still in print. Furthermore, they produced translations of textbooks on geography, astronomy, and physics, and the major works by Björn Gunnlaugsson: the map of Iceland, explained in his 1834 spring lecture, and his textbook, *Tölvísi – Number Wisdom*, published in 1865[16].

Tölvísi – Number Wisdom

Tölvísi was the first book in Icelandic on higher arithmetic and number theory. In his book, Gunnlaugsson expanded on topics in the Danish textbooks he used: divisibility by primes and methods of approximation, both important for land surveyors. After introducing general arithmetic in whole numbers and fractions, Gunnlaugsson continued to Fermat's Little Theorem: If p is a prime number, then for any integer a not divisible by p, there exists a smallest exponent d such that d divides $p - 1$, hence $a^d - 1 \equiv 0 \pmod{p}$.

Gunnlaugsson went into details about the theorem's role in divisibility by primes, and its relation to periodic fractions. Then he explained continued frac-

[16] B. Gunnlaugsson, *Tölvísi*, The Icelandic Literary Society, Reykjavík 1865.

tions for approximating fractions with large denominators, and quadratic, and cubic roots.

The presidents of the Literary Society suspected that even though it had 700 subscribers, only a few of them could use the book. No Icelander worked in land surveying until the mid-20th c. About half of the manuscript, 400 pages, was printed. The remaining topics: equations of first, second, and higher degrees, proportions, logarithms, interests, permutations, and combinations, might have been useful to the growing classes of merchants and craftsmen, but were never printed. Although it was praised, its advanced content was inaccessible to most readers, reflecting limited demand for such knowledge in Iceland at the time. The book was never used as a textbook in the Learned School, the sole educational institution.

The development in Europe and the Reykjavík School

By 1832, the classical final examinations from a *gymnasium*, the *Abitur*, became the sole means of qualifying for university matriculation in Prussia. The Prussian model had an impact on other states because mutual recognition of diplomas was necessary for university students to matriculate in other states[17]. The assimilation of secondary schools into the new model was associated with a redefinition of the boundary between them and universities[18]. The *gymnasium* had a significant influence in Scandinavian countries. Already in 1850, the *Examen Artium*, which previously had to be taken for entry to the University of Copenhagen, was now to be taken at the Learned Schools[19].

The Learned School in Iceland moved from Bessastadir to Reykjavík in 1846. On that occasion, the school received new regulations[20]. With around 50 students, the school became divided into three grades instead of two, each grade being repeated once. Its main goal was to provide the prerequisites for further studies at the University of Copenhagen and the Theological Seminary. In 1850, new regulations were issued in Denmark, published in Iceland with necessary adjustments to Icelandic circumstances[21]. As before, the mathematical subjects – arithmetic,

[17] J.C. Albisetti, *National Education Systems: Europe*, [in:] *The Oxford Handbook of the History of Education*, ed. by J.L. Rury, E.H. Tamura, Oxford University Press, Oxford 2019, p. 149–163.

[18] R.D. Anderson, *The idea of the secondary school in nineteenth-century Europe*.

[19] *Bekjendtgörelse for ophævelse af Eksamen Artium* [Announcement on the Removal of Eksamen Artium], [in:] *Lovsamling for Island* [Code of Laws for Iceland] 1868, vol. 14, p. 440–448.

[20] *Reglement for Latinskolen* [Regulations for the Latin School], [in:] *Lovsamling for Island* [Code of Laws for Iceland] 1866, vol. 13, ed. by O. Stephensen, J. Sigurðsson, Höst, Copenhagen 1866, p. 434–463.

[21] *Reglugjörð um kennsluna og lærdómsprófin í hinum lærða skóla í Reykjavík* [Regulations on the Teaching and Examinations in the Learned School in Reykjavík], [in:] *Lovsamling for Island* [Code of Laws for Iceland], vol. 14, ed. by J. Sigurðsson, O. Stephensen, Höst, Copenhagen 1868, p. 514–528.

including algebra, and geometry, including plane geometry, stereometry, trigonometry, and astronomy – were to be taught throughout the school. Emphasis on languages was traditional: Latin, Greek, Danish, and German, while English and French were optional, and Latin had an increasing share of the hours.

New legislation on Danish Learned Schools in 1871

In 1871, there were around a dozen Danish Learned Schools, including the Reykjavík Learned School[22]. Their overcrowding of subjects, according to the 1850 regulations, led to the Danish parliament passing new legislation in 1871, under which the Learned Schools' uppermost grades were divided into a language-history stream and a mathematics-science stream[23].

In 1875, the Icelandic *Althingi* parliament, which had acquired legislative power in 1874, appointed a School Commission, including headmaster and linguist Jón Thorkelsson[24]. The Commission's proposed regulations for the Reykjavík Learned School were in many respects similar to the 1850 regulations and far from the new Danish legislation[25]. The school was considered too small to be divided into two streams. There were to be five grades, with the last one to be repeated. Danish was to be taught for four years as before, and mathematics in all grades, its content remaining the same as in the 1850 regulations. Latin and Greek were to keep their former status, with English to be taught for the first four years, and German in the last two years as optional, previously compulsory for the first four years. French was to be taught in all grades, chosen as the main foreign language, as priests, physicians, county magistrates, and other officials needed to communicate with French seamen along the Icelandic coasts[26]. This proved to be impracticable; there was no tradition of advanced French in the country, and the preparatory educators, mainly priests around the country, could not assist the applicants.

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[22] N. Jensen, *Gymnasieskolens historie – Latinskolen, Katedralskolen, Den lærde Skole* [The History of the Gymnasium School – The Latin School, The Cathedral School, The Learned School], https://www.litteraturpriser.dk/gymhist.htm [accessed 10.05.2025].

[23] V. Skovgaard-Petersen, *Dannelse og demokrati. Fra latin- til almenskole. Lov om højere almenskoler 24. april 1903* [Culture and Democracy. From Latin School to High School. Law on High Schools 24 April 1903], Gyldendal, Copenhagen, 1976, p. 12.

[24] *Álitsskjal nefndarinnar í skólamálinu gefið út af tilhlutan ráðherra Íslands* [The Commission's report on school affairs, issued by order of the Minister for Iceland], Prentað í smiðju E. Thórðarsonar, Reykjavík 1877.

[25] H. Thorleifsson, *Saga Reykjavíkurskóla* [The History of Reykjavík School], vol. 1, Bókaútgáfa menningarsjóðs, Reykjavík 1975, p. 38–50.

[26] *Álitsskjal nefndarinnar í skólamálinu*, p. 19–47.

Repercussions in 1877

Lobbying between the headmaster of the Reykjavík School, its teachers, the Governor, and the Minister of Icelandic Affairs in Denmark is revealed in documents preserved in the National Archives of Iceland. Governor Hilmar Finsen sent the Commission's proposals to J. Nellemann, Minister of Icelandic Affairs, expressing in a long letter his own concerns about the workload of the pupils who were studying mathematics and Latin at the same time. He suggested that mathematics should end after the fourth year, after which German, previously the main foreign language after Danish, would become a compulsory subject for two years. The Reykjavík Learned School would then become like a language-and-history stream in the Danish Learned Schools[27].

Minister Nellemann forwarded the proposals, expressing his own view. Increased instruction in Danish was of the greatest importance to Icelandic officials as a business language. Religious studies should be taught through all grades and German as a compulsory subject in the last two grades. This would not overload the pupils, as mathematics could be reduced[28]. When the regulations were published in 1877, Danish and religious studies were to be taught in all grades, while mathematics was to be completed in the fourth grade[29].

In *Althingi*'s session in 1877, H. Friðriksson, teacher of German and a member of *Althingi*, asked the Governor why the teachers and the administration of the school had not been given an opportunity to present their opinion about the new school regulations before they were adopted. Friðriksson criticized the fact that much of what had previously been taught in mathematics was now abandoned. One could say that not everyone was expected to become a mathematician, but by this act, general education was reduced. Mathematics had a great role, as it was a kind of instruction in thinking for humankind. No institutions in France, England, and Germany at the same level as the present school failed to teach at least as much mathematics as had been done in Reykjavík Learned School up to the present time. The Governor replied that he had thought that the headmaster would inform the teachers. He had been a member of the Commission[30].

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[27] NAI, Íslenska stjórnardeildin [The Icelandic Governmental Department], Skólamál [School affairs], S. VI, 5. Isl. Journal, vol. 14, no. 705.

[28] NAI, Skjalasafn landshöfðingja [The Governor's Archive], Tillögur ráðgjafans um reglugjörð fyrir hinn lærða skóla [The adviser's proposal on regulations for the Learned School], LhJ 1877, N no. 621.

[29] *Auglýsing um reglugjörð fyrir hinn lærða skóla í Reykjavík* [Announcement on the regulations for the Learned School in Reykjavík], "Stjórnartíðindi fyrir Ísland" 1877, A-deild, no. 8, 12.07.1877, p. 20–33.

[30] *Fyrirspurn þingmanns Reykvíkinga til landshöfðingja viðvíkjandi hinni nýju skólareglugjörð* [A parliamentary question from the Member of Parliament for Reykjavík to the Governor concerning the new school regulation], "Alþingistíðindi" 1877, vol. 2, p. 637–643.

Althingi resolved that a board of all the teachers and two others should be set up and propose alterations to the 1877 regulations. The teachers were, however, not unanimously in agreement with reverting to the Commission's proposals. Headmaster and linguist Jón Thorkelsson, a member of the Commission, stated in a separate letter that the present quantity of mathematics, nearly the same as required in the language-history stream in Danish Learned Schools, would suffice for all but those who were heading for the Polytechnic College in Copenhagen. Hardly more than one Icelander per decade would attend the Polytechnic College. Those few would have to seek private instruction in mathematics. Hours for more mathematics would have to be gained at the cost of the languages, and he put the greatest emphasis on them[31]. This situation remained unchanged until 1919.

Aftermath

The Reykjavík Learned School thus became a language-and-history stream school in the Danish school system with less mathematics teaching than previously. The absence of higher mathematics education coincided with a period when Icelandic society should have been preparing to build up its infrastructure for imminent industrialization. The need for mathematics for that end was not yet perceived. At that time, Icelandic society lacked roads, bridges, harbors, and durable buildings. No modern technical knowledge existed in the country, and there was no military with its need for knowledge of engineering. Neither the Governor nor the Minister of Icelandic Affairs in Copenhagen seems to have thought of any reason for mathematics education, such as its contribution to the technological and socio-economic development of society, when they exerted their influence on Iceland's school affairs, most likely under pressure from the headmaster.

When the authorities began to realize that there was indeed a need for technical knowledge, there was no universal agreement that the origin of such knowledge should come from the Learned School. In 1886, the authorities' attention was drawn to the fact that it might be less expensive to pay a salary to an Icelandic engineer than to a foreigner. Also, an Icelander might be better acquainted with local conditions and might remain in Iceland longer than any foreigner[32].

That same year, the first Icelandic engineer, Sigurdur Thoroddsen, began his studies in Copenhagen. The office of National Engineer for Iceland was established in 1893, and Thoroddsen was appointed. In 1883, Björn Gunnlaugsson's

[31] NAI. Íslenska stjórnardeildin [The Icelandic Governmental Department], Skólamál [School affairs], S. VI, 6. Isl. Journal, vol. 15, no. 680.

[32] S. Thórdarson, *Frumherjar í verkfræði á Íslandi* [Pioneers in Engineering in Iceland], Verkfræðingafélag Íslands, Reykjavík 2002, p. 13.

grandson, Björn Jensson, was appointed to teach at the Reykjavík School, having studied at the Polytechnic College. After Jensson's death in 1904, Thoroddsen chose to apply for the post of mathematics teacher at the Reykjavík High School, rather than continue the thankless task of Iceland's National Engineer[33].

The next Icelandic mathematician, Ólafur Daníelsson, studied mathematics under Jensson before he completed his doctoral degree in mathematics at the University of Copenhagen in 1906. According to a friend's memoirs, Jensson opened Daníelsson's eyes to the wonders of mathematics[34]. In 1919, Daníelsson became a pioneer in promoting a mathematics stream at the Reykjavík School, still the only upper secondary school. Daníelsson's teaching inspired G. Arnlaugsson, the pioneer of 'modern' mathematics teaching in Iceland in the 1960s. There are therefore direct links within the tiny Icelandic mathematical community. Gunnlaugsson, Jensson, Daníelsson, and Arnlaugsson were linked by personal bonds. Daníelsson and Arnlaugsson raised the standards of mathematics in the Icelandic school system in the 20th c. and ensured a permanent place for mathematics education in Icelandic culture.

Conclusions

Turning to the research question: 'What circumstances in a sparsely populated, isolated island like Iceland allowed for the development of education, particularly mathematics education, on par with other European nations?'.

In early modern times, Icelanders did not lack the mathematical prerequisites to conduct trade with foreigners or to operate cathedral schools, supported by privileges at the University of Copenhagen, Iceland's window into European culture.

The 19th c. brought mathematical challenges to Iceland. After a catastrophic fall in population, maintaining the cathedral schools became difficult on the threshold of new modern requirements in science and mathematics education in European schools, as reflected in the University of Copenhagen. By a miraculous chance, resulting from Danish efforts to gather knowledge about their colony through land surveying, one person, Gunnlaugsson, could meet the university's requirements and ensure its standards in mathematical subjects until the 1860s. Reports on cultural events, organized by the Learned School, and publications issued by the Literary Society, show a balance between traditional, classical, and scientific cultural activities until the 1870s.

[33] S. Björnsson, *Menntun íslenskra verkfræðinga* [Education of Icelandic Engineers], [in:] *Verkfræðingatal*, ed. by J.E. Vestdal, Verkfræðingafélag Íslands, Reykjavík 1981, p. viii–xiv.

[34] G. Arnlaugsson, S. Helgason, *Stærðfræðingurinn Ólafur Dan Daníelsson. Saga brautryðjanda* [The mathematician Ólafur Dan Daníelsson. The story of a pioneer], Háskólaútgáfan, Reykjavík 1996, p. 11.

When secondary schools in the Danish school system were split into two streams, following the model of the German *Gymnasium*, the Icelandic Learned School could not follow. It was too small to be split into two streams, and the idea of continuing to run a combined stream where mathematical sciences had the same status as the classical languages failed to gain support. The language teachers, fearing the loss of their own status, could persuade the officials, the Governor, and the Minister of Icelandic Affairs, that studying the ancient Latin language and mathematics simultaneously would be too heavy a workload for the students. The Icelandic Learned School could no longer keep up with European secondary schools and may not have reached that level fully until the mid-20th c.

The Icelandic sparsely populated community always depended on strong individuals, and there was no person to defend the status of mathematics in the 1870s. But Gunnlaugsson's dedication survived through his grandson Jensson and a sequence of students, Daníelsson and Arnlaugsson, who carried on the spirit of commitment to mathematics to the extent necessary to bring Iceland on par with other European communities.

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