Pioneers of Science Education

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In this series I will look at some of the pioneers of science education, either in terms of pedagogy, curriculum development or science education research. Some of them have an Irish connection, but all have had an influence on the teaching and learning of science in Ireland. In PoSE #1 we looked at Maria Edgeworth, who was a friend of Jane Marcet (PoSE #3), and in PoSE #2 at Richard Dawes, a pioneer of child-centred science in context. In PoSE #3 we looked at the life of Mrs Jane Marcet, one of the earliest popularisers of science, especially for women. PoSE #4 looked at J.M. Wilson, who served on a Royal Commission with Thomas Huxley (PoSE #5), who also promoted technical education like Br. James Burke did in Cork.

#6 James Dominic Burke: pioneer of technical education (1833-1904)

Introduction

The subject of this article is Br. James Dominic Burke (1833-1904), a science teacher in the North Monastery in Cork, who pioneered technical education in Ireland and elsewhere. He is probably not as well known internationally as our previous subjects, but we are indebted to Daniel Kelleher for his biography of Burke (Kelleher, 1988), our main source for Burke's life and work. You will look in vain in John Coolahan's book on Irish education in the section of technical education for any mention of Br. Burke and his work. Daniel Kelleher, himself a Christian Brother, has rescued Br. Burke from obscurity and given him back his rightful place in the history of Irish science education.

*"Even though the phrase 'guided discovery' appears over and over again in the literature of the 'new approaches' to science teaching, Br Dominic was championing the heuristic method, with modifications, during the latter part of the last [19th] century. Hidden away within the walls of the North Monastery in Cork, he was undoubtedly in the foremost ranks of Catholic teachers." (*Kelleher, 1988, p.7)

His fame as an educator was widely known, even in America and on the Continent, as the appreciation below shows.

"He must be considered one of the great educators of the nineteenth century, whose monastery schools in Cork were the wonder of all who visited them and in some ways were years ahead of similar institutions in England and on the continent."(Reville, 1916)

Br. Burke was born and worked at a time when Ireland was still part of Great Britain, although its education system was separate. Kelleher says (*ibid*, p. 37): *"While England had Huxley and Armstrong, Ireland had James Dominic Burke who preached the value of science and practical education."* Burke pioneered and promoted the heuristic method of teaching science in Ireland, now associated most with H.E. Armstrong (PoSE #7), the English chemistry professor, in the second half of the 19th century. Br. Burke spent most of his teaching career at the North Monastery in Cork and he put the 'North Mon' (Figure 1) on the map as a centre of educational innovation in the late nineteenth and early twentieth centuries..

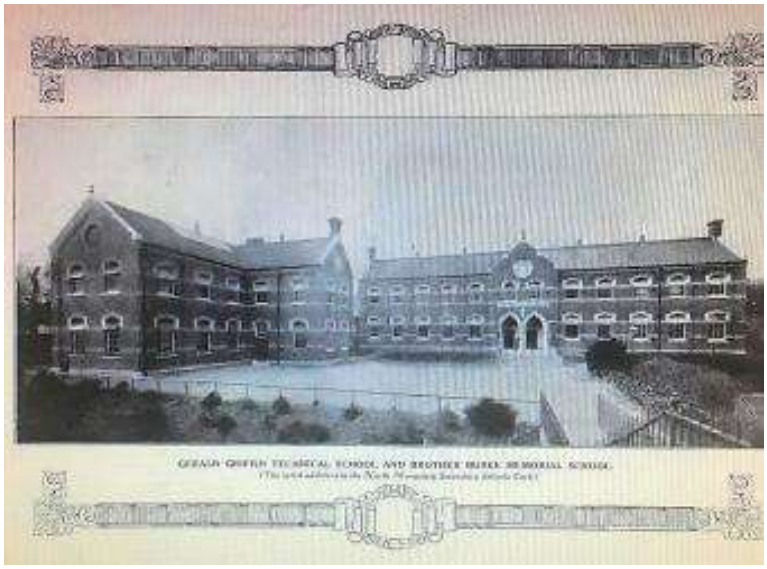

Figure 1: Photograph of North Mon, 1919 from 'Cork: Its Trade and Commerce', showing the Gerald Griffin schools on the left and the Burke memorial Schools in the centre. (Source: Cork City Library)

Education and early years

Dominic Burke was born in 1833 in Limerick city to John Burke, a cabinet maker, and Mary (née Ahern), but moved shortly afterwards to Newmarket-on-Fergus, in Co. Clare, where his father worked as a carpenter on Dromoland Castle. Dominic was educated at the CBS School in Sexton Street, Limerick. He left school at 15 and was apprenticed as a cabinet maker. Due to pain in his right arm he switched to bookbinding, which fostered his love for books. This is reminiscent of the young Michael Faraday who was also apprenticed to a bookbinder and read avidly. In 1852 he entered the Christian Brothers at age 18 ½, first in Waterford and then in September he was transferred to the North Monastery, Cork, where he spent most of his working life, except for a period 1890-96 when he worked in Dublin. He was trained on the job as a teacher and was widely read in mathematics, science, history and theology.He continued to read and study throughout his life, and this was probably the cause of his eye problems which eventually left him sight in with only one eye.

The photo in Figure 2 shows him dressed in his usual clerical robe and everyone he met commented on his pleasant manner.

Figure 2: Br. Dominic Burke

A more characteristic pose shows him (Figure 3) in his laboratory, surrounded by scientific apparatus, but reading a book.

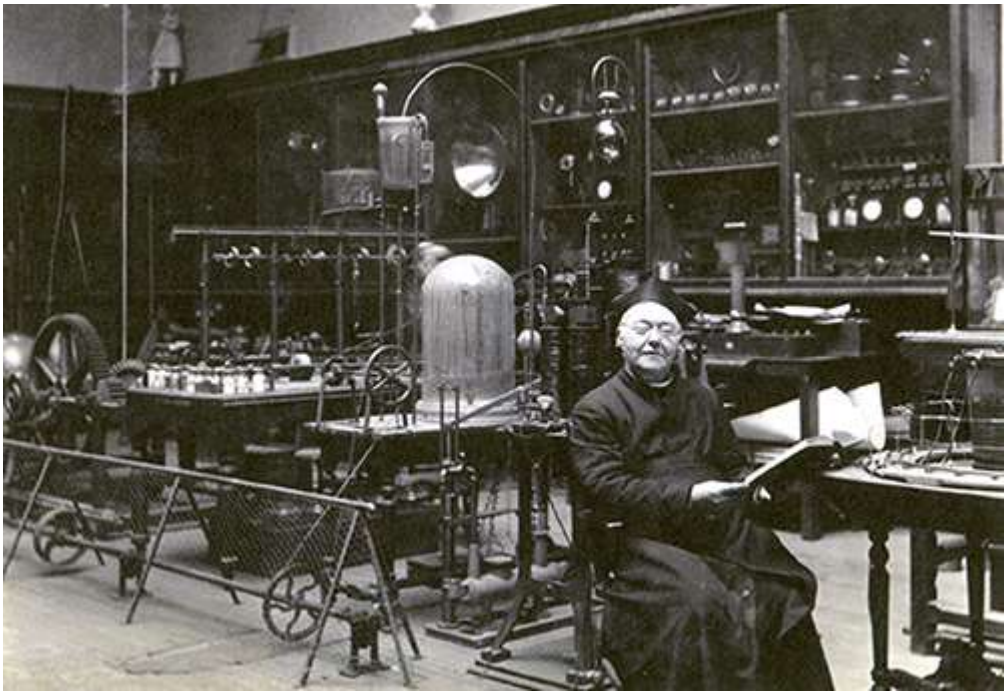

Figure 3: Brother James Dominic Burke in the Science Laboratory of the North Monastery. Image source: ***North Mon 200: Comóradh 200 bliain na Mainistreach Thuaidh.***

Table 1 gives a short summary of the main events in his life.

Table 1 Timeline of Br Burke's life

1833	Born in Limerick
1852	Entered the Christian Brothers in Waterford
	Transferred to the North Monastery Cork on 10/9/1852
1878	Director of the North Monastery School
1889	Science exhibition organised by the CBS
1902-3	Cork Exhibition
1904	Died in Cork
1913	The Brother Burke Memorial Extension opened

Career as a teacher at the North Mon

"The Christian Brothers opened their Cork school in 1811. The system of secondary education was introduced in 1879. All secondary schools were fitted with fully-equipped laboratories for the teaching of science, and special workshops for manual instruction.

However, the North Monastery pioneered science instruction early in the second half of the nineteenth century. In 1857, Br James Dominic Burke arrived at the North Monastery and under his guidance the students began the study of natural philosophy (science).

Br Burke is widely acknowledged as the father of vocational education in Ireland and made the 'Mon' a centre of excellence in scientific and technical education.

At this time, Br John P Holland, (inventor of the submarine) studied in the Mon under the guidance of Br Burke. Brother Burke established an industrial museum, bringing together materials for nature study, collecting scientific instruments, acquiring manual and mechanical equipment, and gradually building up a laboratory, all tending towards a fully-equipped Day Trades Preparatory School." (McCarthy, 2017)

Br. Burke joined the North Monastery schools in 1852 and apart from the period 1890-96, when he worked in the CB headquarters in Dublin, he remained at the school in Cork, celebrating his golden jubilee in 1902.
"From the beginning [in Cork] he threw himself into the work of the schools with characteristic devotedness and energy. Being endowed with fine and varied talents, and being of studious habits, he quickly acquired an extensive and precise knowledge of many subjects, while his ardour in study was not greater than his desire to impart information to others. His interest embraced old and young. To diffuse knowledge among the men of the city he organised Sunday lectures on scientific subjects, and his popular treatment of these subjects created so much interest in his lectures that the spacious rooms of the North Monastery Schools were filled with men or varying ages eager to learn from so able a master. On these occasions he sometimes entertained his audience with experiments, showing many of the processes involved in the manufacture and preparation of things used in everyday life. On week days he was busy with his boys in the science rooms and laboratories, which he had furnished with all apparatus required for a complete and thorough instruction in practical physics and chemistry. To these laboratories he added rooms for metal-work and manual instruction in wood-work." (Christian Brother, 1926, p. 508)

The classes in his day were enormous: anything from 120 to 80 boys, presenting an educational challenge as well as disciplinary one.

His practical, hands-on approach to teaching also extended to other subjects outside science and technology, for example, music education.
"At the same time [1878], the influential Christian Brothers secondary school, the North Monastery, began 'pioneering work in music education.' Under the tutelage of Brother Dominic Burke, students learned singing and attended a formal music class. Burke promoted the tonic sol-fa method of sight singing (rather than reading sheet music), converting a number of Thomas Moore's Irish Melodies to tonic notation. The school was popular among Cork's ambitious working-class families, thus making music familiar and accessible to the emerging population of city residents." (Lane and Murphy, 2016, 28)

Displaying science and technology

"Another means he adopted for communicating information to the boys of the school and the adult population of the city was a well-furnished museum, into which he had collected an extraordinary number of specimens of minerals, birds, animals, and fabrics of various descriptions in their different stages of manufacture. On Sundays it was usual to see groups of men moving around the class-rooms observing closely these objects, which were displayed and classified in beautifully-designed glass-cases and discussing their origin, production, and uses." (Christian Brother, 1926, p. 508)

One of the unusual and innovative aspects of Br. Burke's teaching of science and technical subjects, was the formation of a museum of objects, spread through the school in laboratories, corridors and classrooms. These were an integral part of his teaching in connecting the theory with practice, the ideas with their application. The museum was not a random collection of objects, like the popular cabinets of curiosities, but they were displayed and organised with

an educational intention. Many manufactures across Great Britain sent him samples of their products and raw materials.

International reputation

"His ability and capacity to give a lead in education were recognised by the best thinkers and workers in the same field, hence his advice and opinions were sought and valued."
Christian Brother, 1926, p. 509

In the late nineteenth century many people went to Cork to see the North Monastery Schools and the work of Br. Burke, and if anything, this increased after his untimely death. He was called to give evidence to various Commissions, whose commissioners came to Cork to visit the schools and see his work first-hand.
Kelleher writes (ibid, p. 9):
"Br Burke was able to overcome these hardships by the magnetism of his personality which attracted the non-Catholic no less than the Catholic, and towards the end of his life his school and methods of teaching were referred to in the House of Commons [in London] as an ideal system for his time. Educationalists and politicians from Great Britain, Europe, America and beyond began to arrive and admire his projects. His school was seen as a model which the technical system of education could emulate."
One thing that is frequently said about Br Burke and his achievements (see summary below), is that he was ahead of his time. A CB commentator in 1915 said
"He was a hundred years ahead of his time, and sixty years ago he introduced art, science, and technical training to the classrooms, when their meaning was hardly known in other schools and colleges in the country. His name is so inseparably connected with the North Monastery that one cannot be mentioned without the other."
CBS, (1915).'The North Monastery, Cork.' Editorial in *The Collegian*. (Quoted in Kelleher, p. 9).

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Figure 3 gives an impression of the density of equipment collected by Br. Burke and evidently this was true throughout the school in his museum.

He took science outside the classroom also by giving lectures in Cork at the Literary and Philosophical Society and later at the Scientific Association. He participated actively, together with his students, in the 1883 and 1902/3 exhibitions in Cork, the first being run in order to raise funds for the CB schools. He also sent exhibits to the 1904 World's Fair in St. Louis, USA.

Technical innovator

Br. Burke mentored the young John Holland, who worked in the North Monastery from 1858 to 1861, although later he left the order and moved to America. There he developed the first successful submarine. While in Cork Holland learned about using electric motors for

propulsion and it is said tried out model submarines, helped by Br. Burke. In 1877 Br. Burke used a battery of 120 Callan cells to power a searchlight which lit up Cork.

"Cork was ablaze with illuminations... to celebrate the Jubilee of the reigning Pontiff, Pius IX. The North Monastery, on its commanding site, presented a brilliant appearance, and people gazed in wonder at the great beam of white light which brightened up the hills far away across the Lee. Brother Burke had fitted up a battery of 120 Callan cells, connected with a great electric [arc] lamp." Anon, 1916, p.

He invented a chemical bench. Later marketed by Philip Harris and Co. In 1889 Br. Burke organised a Grand Drawing and Bazaar in the Corn Exchange to raise funds for the schools. At this he built and displayed an electric tramway, nine years before the Cork public tramways were opened.

Main educational achievements

Br. Burke and the North Mon worked with working class boys, who otherwise would not have had an education. They gave them oine of the best educations available at that time in Ireland the North Mon regularly came top of the Intermediate Examination (introduced in 1878), even though it emphasised a liberal arts, classical view of education rather than one based on science and technology. Her are soe of Br. Burke's main educational achievements:

- Introduced an emphasis on science and technology into Irish elementary and secondary education, especially in the Christian Brothers' schools.
- Pioneered the use of a museum of everyday objects as part of the teaching strategy to show the relevance of science and technology.
- Connected the world of education with that of work with his emphasis on fitting boys for their future workplace and giving them useful knowledge and skills.
- Introduced the use of object lessons with junior classes.
- Encouraged a hands-on, experimental approach to science teaching even with large classes.
- Trained boys to be able to give public presentations of their work at open days and in public exhibitions, usually without any direct supervision.
- Made science and technology available to working men through his Sunday lectures and exhibitions, thus pioneering life-long learning.

Br. Burke's legacy

"Through the helps for education introduced by Br. Burke, and the splendid organisation and methods of teaching he fostered, the North Monastery Schools took and held a leading place among the great secondary schools of the country. In these schools the highest literary education was enhanced by thorough teaching in practical science, technical instruction and manual training." (Christian Brother, 1926, p. 509)

Figure 4.a: Burke Memorial School Extension

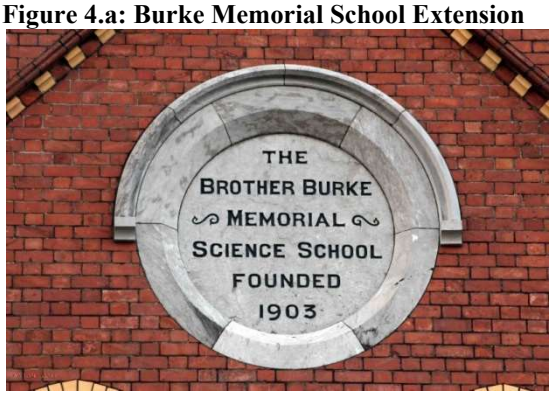

Figure 4.b The plaque on the Science School

One test of a person's influence and impact is what of their work survives after their death. In 1913 the Burke Memorial School Extension was opened. In 1908 the schools sold it off to Cork City Council and it is now a music school. The museum that was the envy of the educational world has also gone. In 1914 the British army removed the metalworking equipment for the war effort and closed the radio room. Does anything remain as a legacy to Br. Burke's pioneering work? The North Mon has continued to have a strong science and technology tradition, now referred to as STEM, and is in the process of building new laboratories and workshops. It has an annual Burke prize.

"His ability and capacity to give a lead in education were recognised by the best thinkers and workers in the same field, hence his advice and opinions were sought and valued."(Christian Brother, 1926, p. 509)

Then and now

In 1903 we have a contemporary description of the CBS in Cork, just before Br. Burke's death. It is interesting to compare that with today.

"As now completed, the Christian Brother's Schools at the North Monastery furnish accommodation to fifteen hundred pupils. The education provided extends from the primary stages through all grades of the Intermediate. All the students receive technical instruction – school museums and natural science objects being provided for the very young, and manual workshop practice and scientific laboratory work for the older. Drawing is universal for all ages. There is also a school garden in which a number of agricultural students look after their individual plots, and the ground are extensively planted with specimens of trees and shrubs, both indigenous and foreign. It is no exaggeration to say that the whole of this

achievement is due to the personal effort of Br. Burke, who, therefore, stands out in Ireland as the grand pioneer of technical education." (Comerton, 1903, 122)

Comerton, J. (1903) 'Pioneers of Technical Education – III. Rev. J.D. Burke, *Irish Technical Journal*, I(9), 122. Quoted in Kelleher, ibid, p. 169

Conclusion

Probably everyone had heard of the other names in this series of Pioneers of Science Education, but almost nobody has heard of Br. Burke, even in Ireland, although this would not have been true at the end of the 19th century and start of the 20th century. His accidental death in 1904 cut short a productive life and during his career he transformed the North Monastery schools into an educational powerhouse, despite its intake of poor, underprivileged boys. He is worthy to be remembered and celebrated as a pioneer of STEM education in Ireland, who raised the profile, value and reputation of manual work and the importance of a curriculum tailored to the needs of its recipients.

"For him education was meant to actualise innate potentiality in the individual so as to produce a balanced integrated adult person. It was his basic belief that an education grounded on the practical could achieve this goal just as effectively as the prevailing idea that an 'educated' adult had to be the product of the bookish classical school. He intellectualised arts and crafts." (Kelleher, p. 216)

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