

**A celebration of the 25th anniversary of the Mathematics Learning
Centre at the University of Limerick**

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*Dedicated to Prof. John O'Donoghue and all of the staff, past and present, who work and have worked
in the Mathematics Learning Centre at the University of Limerick.*

ABSTRACT. Mathematics Support Centres (MSCs) are centres located in third-level institutions that are aimed at supporting students with their mathematics modules. There has been an increased demand for MSCs in the last few decades to combat the so-called “*Mathematics Problem*”. While the first MSC was established in Queensland, Australia in 1986, now MSCs are much more wide-spread throughout the world, particularly in Europe. The first MSC established in Ireland was the Mathematics Learning Centre (MLC) at the University of Limerick. The MLC was established in September 2001 and in 2026, the MLC celebrates its 25th birthday. The author of this paper wishes to pay homage to the centre by providing the history of the centre from its founding to 2026. In writing this article, the author had correspondence with all previous managers of the centre and also with key people in the history of the centre.

1. BRIEF HISTORY OF MATHEMATICS AND STATISTICS SUPPORT

Mathematics and Statistics Support (MSS) refers to support offered to students at third-level institutions (not necessarily mathematics students), that is not a part of their regular programmes of teaching. MSS is usually delivered via a Mathematics Support Centre (MSC), and many MSCs have been established throughout the world, with the first examples being in Australia, the UK and Ireland. At first, MSS was considered “nice to have but not essential” [16, p. 6], however the perception of MSS has morphed into an essential part of university provision [23]. MSCs were established in universities in reaction to the so-called “*Mathematics Problem*” (MP) [23]. The MP refers to the declining mathematical readiness of incoming students into universities. The problem was first observed in the UK [34], where it caused concern mostly in engineering and physical science departments. Diagnostic testing provided research-based evidence that the mathematical abilities of incoming students into UK universities were indeed declining [21]. Subsequent studies showed that the problem was also present in Ireland [27, 8]. See Section 4 for a discussion on the diagnostic testing carried out at the University of Limerick. There are many issues that contribute to the MP, but what appears to be clear is that secondary-school mathematics does not seem to adequately prepare students for the mathematics they encounter at third level [23].

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In the UK, contributing factors to the MP include that second-level students only study mathematics up to the age of 16 [18] and that there is a lack of qualified teachers, at least in England [32]. In Ireland, there was a shortage of fully qualified mathematics teachers in secondary schools, with out-of-field teachers (OOFs) (i.e., teachers who are qualified to teach other subjects but not mathematics) carrying 48% of the responsibility of teaching mathematics nationwide in 2010 [31]. This problem has been partly addressed by the Professional Diploma in Mathematics for Teaching (PDMT) qualification that upskills OOFs to mathematics teachers [14]. The rate of out-of-field teaching in mathematics in Ireland is now 25%, a clear reduction from 2010. However, despite reducing the number of OOFs and having 98% of students studying mathematics up to the age of 18 [40], there is still evidence of the MP in Ireland [2], indicating that additional factors, other than these, contribute to the MP.

Due to the myriad of issues faced by incoming students, universities established MSCs throughout the 1990s and early 2000s. These early MSCs catered for first-year university students, enrolled in engineering and science degrees, who were deemed ‘at risk’ of failing their mathematics modules [23]. However, since the early 2000s, the number of disciplines catered to by MSCs has increased dramatically, partly in response to the increased demand for analytical and quantitative methods used in humanities disciplines [23]. Engagement by students in mathematics courses also increased since the early years of MSS support [22]. Moreover, not all students who attend MSCs are struggling as there is evidence that MSCs in Ireland were used by mathematically-strong students to further improve their grades [24], particularly in second and third year. Second- and third-year students now engage more with MSS compared to the earlier years of MSS delivery when first years comprised the majority of student contacts.

The way in which MSS is delivered has evolved over the past few decades. In the early years, academic staff were mostly responsible for delivering support. However, as MSCs became more established and respected as an integral part of their respective universities, dedicated, full-time staff became more common [23]. Now many centres have a director or manager, with the actual support being delivered by postgraduate students or part-time lecturers. Postgraduate students, particularly those not coming from an education background, can lack various pedagogical skills that are needed for high-quality learning amongst service-mathematics students [38] (i.e., students enrolled in engineering, business, science, technology and education courses) and therefore, tutor training has been identified as central to the continued success of MSS delivery. There have been many efforts to provide training to tutors, including at the University of Limerick [7]. Tutor training has been shown to have benefits beyond teaching, with tutors developing a more professional attitude, growing in confidence and becoming better not only at teaching but also at mathematics more generally [15].

There is substantial evidence that students recognise the value of MSS [29], including mature students (i.e., students who are at least 23 years of age on the 1st of January of the year in which they start their course) [5]. In Ireland, a nationwide survey was carried out regarding student engagement with MSS and the impact of MSS on students. The report found that, “over 56% of the students felt the [MSS] was helpful to their confidence in mathematics” [29, p. 37]. Moreover, “over 56% of respondents felt that [MSS] had an impact on their mathematics performance” [29, p. 39]. MSS has also assisted with drop-out rates at universities. For example, in a study at Maynooth University in Ireland, “26 Maynooth University students said that they had considered dropping out of university due to mathematical difficulties but cited the MSC (at Maynooth University) as influencing their decision to remain” [25, p. 35]. Additionally, MSS has been shown to improve the mathematical standards of students in universities [26]. Despite these positive outcomes, there is evidence that some weaker students tend

not to engage for a variety of reasons including fear, embarrassment, feeling intimidated or a lack of awareness that they even needed help [35, Table 1].

The rest of the paper is structured as follows: In Section 2, we provide the methodology employed in collecting the data for this article. In Section 3, we provide the history of the Mathematics Learning Centre (MLC) at the University of Limerick. In Section 4, we provide details on the research and outreach activities carried out by staff in the MLC. In Section 5, we discuss the future of the MLC by considering the impact of Generative AI (GenAI) on the centre and on the MSS community in general.

2. METHODOLOGY

Several sources of information were used when writing this article, including the MLC's annual reports, interviews conducted with previous managers of the MLC, quotes collected from previous tutors who worked in the MLC, a statement from **sigma** (a network for excellence in mathematics and statistics support based in the UK) and a statement from the Irish Mathematics Learning Support Network (IMLSN). Much of the quantitative data supplied in this article was made available to the author through MLC annual reports. These reports were graciously provided by the current managers of the MLC and provide information on student engagement with each aspect of the MLC, the modules for which students sought help and the courses to which students belonged. In more recent reports, aims and goals for the upcoming year were also included. These reports proved invaluable for providing context and background information on the MLC, particularly in the case of the earlier years.

The author also conducted interviews with the person credited with founding the centre, six of the seven previous managers of the MLC and had email correspondence with one of the previous managers. The questions used for these interviews are given in the Appendix of this article. The interviews were carried out on Microsoft Teams in December 2025 and were recorded. Each interview lasted between 30 and 90 minutes and the recordings of the interviews were stored in a secure OneDrive folder. The author also reached out to others who were less directly involved with the MLC, but who nonetheless had an impact on the history of the MLC. Such people include Prof. Sarah Moore, Prof. Ailish Hannigan and many previous tutors of the centre. The author also collected a statement from the IMLSN committee, and from the chair of the **sigma**-network (Dr Mark Hodds) and the director of **sigma** at Coventry University (Prof. Duncan Lawson) regarding their outlook on how GenAI will impact MSS in the future.

3. CHRONOLOGICAL HISTORY OF THE MLC AT THE UNIVERSITY OF LIMERICK

3.1. Foundation of the centre: 1990 - 2001. The history of the MLC at the University of Limerick began with Prof. John O'Donoghue who, in 1991, transferred to the Department of Mathematics and Statistics at the University of Limerick from Thomond College. At this time, the Department of Mathematics and Statistics was responsible for delivering many service-mathematics modules which can have student numbers that reach well into the hundreds. It was identified, albeit anecdotally, that many students enrolled in such courses were struggling with the level of mathematics required to successfully complete their respective courses. In response, the Head of Department at the time, Prof. Michael Wallace, had introduced support tutorials to aid students. These tutorials proved popular with students, however they did not address the underlying reasons why students were struggling. Prof. O'Donoghue, who had a PhD in mathematics education, was responsible for teaching mathematics and mathematics-education modules. Therefore he found himself at the forefront of the problem and through discussions and encouragement from Prof. Wallace, he was well positioned to address the problem.

In the 1997/98 academic term, Prof. O'Donoghue administered diagnostic tests to students of Technological Mathematics 1, a large service-mathematics module. The test consisted of 40 questions and each test was administered in the students' first mathematics lecture and was hand corrected with an all-or-nothing, 1 point per question marking scheme. Students who received 20 points or less were deemed 'at risk' and advised to attend once-per-week support tutorials for the module as well as a front-end skills package of four tutorials on arithmetic and algebra. Of the 257 students that participated, 69 (or approximately 27%) were deemed 'at risk'. Moreover, it was found that students who were deemed 'at risk' but who availed of the supports provided were significantly more likely to pass their mathematics modules compared to those who had been deemed 'at risk', but who did not engage with the available supports.

The results of this pilot study indicated that many incoming students at the University of Limerick were underprepared for the level of mathematics in their mathematics modules. At the time, the underpreparedness of students had been observed in the UK [34] and elsewhere in Ireland [19]. However, the reasons for this were not well understood nor well researched. The results of the tests caused concern among the staff of the Department of Mathematics and Statistics, including the Head of the Department. It was identified that while the supports put in place were certainly helping students, this was a permanent problem and not a transient one. Hence, the problem would require a more permanent solution.

In the mid-to-late 1990s, the position of Dean of Teaching and Learning was established in the University of Limerick and was filled by Prof. Evan Petty. In conjunction with the position, an award for Teaching Excellence was organised and, importantly for the development of the MLC, a Teaching Fellowship position was created. The Fellowship position involved conducting research over one year on how to improve the teaching within the university. Prof. O'Donoghue made a successful application for the position and his project had several aims, with the first being the design and administration of a bespoke diagnostic test. This test would be a key indicator of student preparedness and would also help identify the areas in which students were struggling. The second aim of his project was to provide on-going, customised support (including support tutorials) to students deemed 'at risk' with the aim of addressing their specific needs. The third aim was to have qualified/trained tutors administer the support tutorials. This project was completed during the academic year 1998/99 and the results largely corroborated with those of the 1997/98 pilot project. 30% of first-year students in Technological Mathematics 1 and Science Mathematics 1 enrolled in the 1998/99 cohorts were deemed 'at risk'. However, the research also showed that support tutorials were helpful in addressing this problem. Another conclusion of the study was that continuous intervention was required. Hence, a recommendation of the project was the foundation of a mathematics support centre. This project was significant as it provided research-based evidence for the need for a support centre for mathematics in the university.

Following this recommendation, Prof. O'Donoghue and Prof. Wallace applied to the Vice President of Academic Affairs (VPAA) for funding to found the support centre. However, this proved ultimately unsuccessful. The VPAA recommended applying for the Higher Education Authority (HEA) Targeted Initiative funding with the university providing administrative support for the application. The HEA Targeted Initiative funding was a government scheme aimed at "support[ing] institutional activities in a range of areas including access" [17, p. 52]. This funding application was successful, however additional help was required to successfully get the MLC set up. The Department of Mathematics and Statistics proved a huge ally in this regard by providing the physical space for the MLC and assisted in providing the equipment necessary for the centre. Another key ally was Prof. Sarah Moore who was the Dean of Teaching at the

time and a strong advocate for support centres in general. In September 2001, the MLC at the University of Limerick was opened and, while Prof. O'Donoghue is credited with founding the centre, in his own words *“without that kind of support [from the Dept. of Math. and Statistics, Prof. Michael Wallace and Prof. Sarah Moore], we would have had a much harder ride and maybe much more difficulty in getting anything started”*.

3.2. Initial phase of the centre: 2001 to 2010. The first manager of the centre was Dr Helen Purtill (née MacMullen) who started as manager of the MLC in September 2001. During her time as manager, the MLC was properly established and many of the customs of the centre that were instituted at this time are still in place in 2026. For example, the centre was open to drop-ins from 10am to 12pm and from 2pm to 4pm, Monday through Friday and support tutorials for specific modules were organised. Dr Purtill attended the lectures for large service-mathematics modules to advertise the centre to the students who were most likely to derive benefit from the service. Furthermore, Dr Purtill conducted a visit to the MSC at Loughborough University in England to exchange ideas on the running of a support centre. Loughborough University (and Coventry University) have two of the longest established MSCs in the UK (dating back to the 1990s) and in 2005 they jointly established **sigma** which was designated by the Higher Education Funding Council for England as a Centre for Excellence in Teaching and Learning (CETL), specialising in university-wide mathematics and statistics support. Dr Purtill's visit began a long collaboration between the University of Limerick and Loughborough and Coventry Universities regarding MSS and research.

During the 2001/02 academic year, 431 individual students attended the centre, which caused problems regarding space. Dr Purtill remarks that, *“at times the centre would become very busy and some students would attend multiple times during the week - it became difficult to manage space and student expectations.”* Evening support tutorials were also provided for the large service-mathematics and statistics modules. These were aimed at providing extra support for mature students and those who may have had gaps in their mathematics knowledge, such as those transferring in from different courses. The courses which comprised the highest percentage of students attending the drop-in were the Bachelors in Business Studies (20.1% in semester 1 and 21.9% in semester 2), Bachelors of Science in Applied Physics (10.6% in semester 1) and Bachelors of Science in Computer Systems (21.6% in semester 2). Applied Physics and Computer Systems may be a surprise as one may assume that physics and computer-science students would be relatively strong in mathematics. However, even students enrolled in mathematics courses attended the centre (4.5% in semester 1 and 7.1% in semester 2). This was early evidence of the secondary-tertiary transition, a now well-documented phenomenon where even mathematically-strong students struggle with the transition between secondary school and university [4]. A positive impact of the mathematics students' attendance was that other students appreciated that even mathematically-strong students find mathematics difficult at university. Dr Purtill remarks that, *“initially we were concerned that students may feel embarrassed to seek help from the centre. But having engineers and mathematics students also attend gave all students the confidence to come and ask questions.”* One clear indication of the success of the MLC was that the failure rates (grades: D1, D2 and Fail) in several service-mathematics modules had declined markedly. In Science Mathematics 1 the failure rate dropped from 29.4% in the 2000/01 academic year to 10.9% in the 2003/04 academic year. Engineering Mathematics 1 (37.7% to 9.8%), Technological Mathematics 2 (29.8% to 16.3%) and Business Mathematics 2 (4.3% to 3.3%) also saw drops in their failure rates. While it is not certain, there is at least an indication that the MLC was partly responsible for the improvement. The statistics above can be found in [10, Table 4].

Dr Purtill was manager until 2003, when Dr Olivia Fitzmaurice (née Gill), who was previously a tutor in the MLC, became the manager. Dr Fitzmaurice was acquainted with Prof. John O'Donoghue from her time studying in the University of Limerick as a Physical Education and Mathematics secondary-school teacher. After talking to Prof. O'Donoghue on a visit to the University of Limerick and completing a higher diploma in Maynooth University, Dr Fitzmaurice completed a PhD under Prof. O'Donoghue's supervision. During her PhD, she tutored in the MLC and she remained as manager of the MLC until 2010. Between 2003 and 2010, the MLC saw a huge increase in the number of students attending. For example, in the 2003/04 academic year, the MLC recorded 1,154 individual students attending the drop-in centre and 511 individual students were recorded attending support tutorials. In the 2009/10 academic year the MLC recorded 2,203 individual students attending the drop-in centre and 1,126 individual students were recorded attending support tutorials. This sharp rise occurred in parallel with developments in how the MLC was funded. The university had included the MLC in its strategic plan in 2001, which helped solidify the centre as an important part of the university, but funding was still precarious as the Targeted Initiative funding was due to expire in 2005. However, in 2004, the Government of Ireland insisted on the participation of all departments in universities around the country in a quality review. The review would consist of a panel of international specialists and the results of this review would be reported back to the government and would impact on government policy and funding decisions. The Mathematics and Science Quality Review panel commended the MLC in the University of Limerick highly. This was seminal for the MLC as it established the reputation, credibility and need for the MLC. One recommendation of the review panel was the maintaining of the MLC as a permanent feature of the university. The executive committee within the university agreed and guaranteed the MLC would continue to be funded internally for at least three years past the end of the Targeted Initiative funding. The Targeted Initiative funding formally ended in 2005, but, through negotiation, it was extended for one year on a reduced budget, after which the university then funded the MLC until 2009. Between 2009 and 2012, the President of the University of Limerick, Prof. Don Barry (who was a former member of the Department of Mathematics and Statistics) funded the MLC through the President's Fund, which was a fund that the president of the university could use for internal university projects.

A major factor in the continued securing of funding after 2009 was that there was a undoubted economic benefit bestowed upon the university by the MLC. Tutors in the MLC noticed many students remarking that mathematics at university was too difficult and that they were considering dropping out of university as a result. Aside from the reputational cost to the university, this would also incur an economic cost. Through assisting a student with their mathematics and keeping the student in the university, especially if they were in first year, the university would retain thousands of euros in fees, which would otherwise have been lost. The number of students required for the MLC to pay for itself in this indirect way was estimated to be only eight students. In 2004, the Dean of Teaching and Learning had completed an independent review of the MLC with results showing that for 20% of students (i.e., certainly more than eight), the MLC was instrumental in retaining them in university. After 2012, the MLC was placed within the Centre for Teaching and Learning (which today is named the Centre for Transformative Learning (CTL)). This was done with four other support centres in the University of Limerick: the Regional Writing Centre, the Science Learning Centre, the Peer Supported Learning Centre and the ICT Learning Centre. Being in the CTL solidified the funding for the MLC and was a big step in securing the long-term survival of the centre.

3.3. Developments in the MLC in the 2010s. Between 2010 and 2015, the MLC had three separate managers. The first was Dr Lisa O’Keeffe, who obtained her PhD from the University of Limerick in 2011. Dr O’Keeffe, like most of the managers, worked in the MLC during her PhD. The second manager was Dr Mark Prendergast who took over from Dr O’Keeffe in 2012. The third manager in this period was Dr Páraic Treacy. Dr Treacy started his PhD in 2009 and became manager of the centre in 2012 after Dr Prendergast. Dr Treacy remained in the role until December 2014. By this time, the MLC was a “*well-oiled machine*” as described by Dr Treacy and the attendance numbers were increasing, both in the drop-in centre and in the support tutorials. The Leaving Certificate helpdesk was a series of outreach classes given to secondary-school students who wanted help preparing for their end of school examinations. This project was started in the 2000s and was running smoothly but was further developed by Dr Treacy. There was also more collaboration with the other learning centres in the university, particularly the Science Learning Centre. The managers of both centres regularly met and compared strategies in order to improve the supports offered by both centres. While the MLC appeared to be going from strength-to-strength, that is not to say that there were no problems. Dr O’Keeffe, Dr Prendergast and Dr Treacy all faced similar issues during their respective times as manager. Firstly, staffing became a major issue. The managers reported finding it more difficult to find enough staff, particularly those with the necessary expertise to work in the centre. There was a large staff turn-over at this time which compounded the issue. Secondly, physical space was also becoming an issue. By this point, the MLC now composed of two separate rooms located beside each other. However, each room is quite small and space would prove a major problem for the next few years.

Following Dr Treacy, the next manager of the MLC was Dr Richard Walsh. Dr Walsh completed a Bachelors degree in Physical Education and Mathematics in the University of Limerick in 2011. He then completed a PhD under the supervision of Dr Olivia Fitzmaurice and Prof. John O’Donoghue in 2015. He became manager of the MLC in the same year. During the initial few years in the role, the number of student contact hours with the MLC sharply increased once again. In the 2014/15 academic year, the total number of contacts recorded by the MLC (this includes drop-in, support tutorial and examination revision) was 6,169. This number increased to 7,448 in 2015/16 and then to 10,023 in 2016/17. This was by far the largest number of contacts recorded by the MLC up to this date, with the previous maximum being in 2009/10 with 8,953. While this development may seem positive, it put severe pressure on the MLC’s resources, particularly staffing. For context, only 11 tutors worked in the MLC in the 2016/17 academic year compared to 22 in the 2009/10 academic year. The reason for the low staff engagement was in part due to the fact that the some PhD students’ funding providers did not allow them to teach during their first year or, if they could teach, the hours in which they could were restricted. In the 2016/17 MLC report, it was suggested that more staff with “*knowledge of higher-order mathematics*” and “*who are mathematics-education focused*” be hired. Although, the report also admits that, “*this goal was also put forward for the past 2 years, however, it is proving very difficult to achieve.*”

Another development regarding staffing in the MLC around this time was the introduction of tutor training. The MLC report from 2014/15 provides a clear description:

“The MLC ran its first tutor training day in August 2015. This training day was targeted at incoming tutors (mostly first-year postgraduates) who had not taught before. The manager of the MLC and two PhD students in mathematics education delivered the course. The main focus was at improving tutoring in mathematics support but was also extended to mathematics teaching in general. 17 tutors took part in the training day with

11 of these coming from the University of Limerick. The others came from other tertiary institutions WIT (1) (Waterford Institute of Technology - now called South-East Technological University) and LIT (5) (Limerick Institute of Technology - now Technological University of the Shannon). This training day was also run in other institutions nationwide in conjunction with other MSC managers involved in the IMLSN. In total, 42 tutors took part nationwide.”

The general sentiment of participants was that the training was worthwhile, although some improvements could be made such as more time being dedicated to developing tutors’ questioning and assessment skills. An account of the training days, including an analysis of participant interviews was published in [7]. Tutor training remains an important component of working in the MLC to this day. In fact, the author of this paper recalls the tutor training he received when he started in 2020. He recalls that the training allowed him to acquire pedagogical knowledge prior to beginning tutoring. Moreover, this pedagogical knowledge can be developed further and it helps tutors develop skills for their future careers.

“The MLC played a pivotal role in shaping my approach to teaching. It opened my eyes to the diverse challenges students face when learning mathematics and reinforced for me that effective teaching isn’t about one ‘right’ method – it’s about communication, flexibility, and meeting learners where they are. My time in the MLC also strengthened my own understanding of mathematics, as working with students challenged me to explain concepts in clear, accessible, and accurate ways.” – Dr Patrick Johnson: Tutor of the MLC from January 2002 to May 2006.

“I found working the MLC to be a challenging, rewarding, and deeply enriching learning experience that has shaped my professional career as a secondary-school mathematics teacher and mathematics-education lecturer. Working with students in a one-to-one capacity and in small groups, I acquired knowledge of common misconceptions, developed my teaching skills, and gained a deeper understanding of the processes that students engage in when learning mathematics. Significantly, for my professional career, I gathered insights on the common misconceptions that students hold, irrespective of the nature of mathematics being studied, that pertain to fundamental concepts in mathematics introduced in primary school. I learnt that mathematics is way of thinking than spans varying branches and requires a deeper understanding of fundamental concepts. This perspective on mathematics, emergent from my experience in the MLC, informs my current work in initial teacher education.” - Dr Stephen Quirke: Tutor of the MLC from September 2015 to May 2019.

Due to the increase in student numbers and the increased responsibilities of the MLC manager, the case was made for a second full-time position within the MLC. In 2017, Dr Aoife Guerin, who had completed her PhD in the University of Limerick in the same year under the supervision of Dr Fitzmaurice and Prof. O’Donoghue, was appointed to this position. Dr Guerin’s year-long contract was renewed in 2018 and she was appointed permanent co-manager in 2019.

Another significant development for the MLC was the securing, in 2019, of €46,573 of funding alongside the other four learning centres in the University of Limerick from the National Forum for the Enhancement of Teaching and Learning in Higher Education to support the development of a Digital Learning Support Hub (DLSH). This initiative, in part, led to the development of 150 mathematics support videos across 3 service-mathematics modules (Science Mathematics 1, Science Mathematics 2, and Engineering Mathematics 2) which were traditionally popular in the MLC for in-person support. The videos, in principle, ranged up to 10 minutes in length (max.) and were aligned with

each of the modules' tutorial sheets (i.e., weekly worksheets given to the students by the lecturer). For example, a collection of these videos would be released to students on concepts relating to Science Mathematics 1's first tutorial sheet at a time that corresponded to when they were studying that material and were expected to attempt that first tutorial sheet. Then another set would be released corresponding to the second tutorial sheet at an appropriate time, etc. In addition, as well as these videos, the MLC developed online questions that students could attempt alongside solutions that they could access after attempting the problems. All of these resources were housed on the university's Virtual Learning Environment (VLE) - Sulis at the time - on a site that was established by the MLC. This work dramatically improved the MLC's online resource support capability.

3.4. Developments in the MLC in the 2020s. The timing of the National Forum funding was serendipitous as the shift to online teaching due to the COVID-19 pandemic in March 2020 occurred in the middle of this funding. In Ireland, all higher-education institutions were instructed to move to online teaching on the 12th of March 2020. We point to [28] for further information regarding the impact of COVID-19 on the teaching and learning of mathematics at third-level in Ireland. For the University of Limerick, the instruction to move to online teaching fell in the middle of the university's second semester. The expertise gained by Dr Walsh and Dr Guerin from working on the DLSH project resulted in a relatively seamless transition between the in-person and online delivery of services in the MLC. The MLC was also in a position to provide workshops for colleagues in the Department of Mathematics and Statistics on the online tools that were available to them for teaching. This assisted the staff in the department with the transition to teaching lectures and tutorials online. This is good example of the continued close relationship between the MLC and the Department of Mathematics and Statistics, even after the MLC moved to the Centre for Transformative Learning. In fact, Prof. O'Donoghue expressed the sentiment that all successive Heads of the Department of Mathematics and Statistics (beginning with Prof. Wallace) were very supportive of the MLC and always offered assistance when asked. This relationship is acknowledged by the current head of the department, Prof. Ailish Hannigan.

"The MLC began as an initiative of the Department of Mathematics and Statistics and we continue to have a strong relationship with the centre. It plays a vital role in supporting and encouraging all our students to achieve their full potential in mathematics and statistics." - Prof. Ailish Hannigan.

The MLC built upon the DLSH initiative by continuing to develop online resources, aimed at other service-mathematics modules, even after the funding had ceased in 2021. The DLSH service proved very popular with 7,902 visits being made to the site in the 2020/21 academic year. This wealth of online resources led to a major shift in how the MLC operated. In-person contacts with the MLC after 2020 decreased markedly, while online engagement soared. This was particularly true for the service-mathematics modules, which now had significant online support available for them. The MLC has its own site on the current VLE for the university, Brightspace. Students can access this site via a link and can then navigate to the specific page for the module they want help with. Each page contains videos in which Dr Walsh or Dr Guerin go through solutions to problems, provide explanations of topics using Geogebra and a collection of other resources. The pages are updated when a new lecturer takes over a module, although this is usually an uncomplicated procedure. Dr Walsh explains, *"The only thing that might happen is that from year-to-year, a lecturer might put something that we have done under tutorial three, they might include it in tutorial two. So, we might just need to rejig it from a student facing perspective"*.

As mentioned, there was a notable decrease in the number of students attending the physical centre, particularly from service-mathematics modules, once the online resources were developed. This coincided with an increase in the proportion of students from mathematics modules attending. With these modules came more advanced topics as explained by Dr Walsh, *“It’s more common for me [now] to help students with concepts related to more advanced topics as opposed to more basic maths”*. He clarifies further, *“Laplace transforms and metric spaces are super common, whereas I probably never helped anybody with those in 2015”*. This shift to mathematics-focused modules has been documented in the literature [33, 23]. Dr Guerin agrees with Dr Walsh that there are more students seeking support with advanced topics, however, she notes that students have always presented to the MLC with more advanced topics, they were just fewer in number and also presented less often. For her, during her time as a part-time tutor in the MLC (2013-2017), she recalls *“students would have come into the MLC with those more advanced modules but they’d have their notes with them and we would work on the problem together”*.

Dr Guerin notes that the MLC is based on an integrated, supportive and collaborative self-help model and through their teaching and learning approaches, everyone in the MLC endeavours to increase the students’ understanding, confidence and enjoyment of mathematics while promoting perseverance. She notes that the creation of a mutually respectful learning environment in the MLC is as important as the mathematics being learned and taught. Indeed students have commented on ‘the lovely atmosphere’, the ‘non-judgmental support’, ‘the ability of tutors to explain concepts’ and the ‘increased understanding and decreased stress-levels’ as being substantial contributors to their increased understanding, confidence and successful completion of their mathematics modules.

We conclude this section by looking specifically at how the work of a tutor changed between 2020 and 2026, as major changes were made in the delivery of MLC support services during this time. The author of this paper started working in the MLC in January of 2020 and hence is familiar with the operation of the MLC during the lockdowns. The drop-in centre ceased operation in March 2020 with an online appointment system being used in its place. Tutors would be assigned a number of hours per week that students could then book, with a maximum of two hours per week per student. Students could attend appointments alone or in groups, however from the MLC report in 2020/21, most students attended alone. Students were expected to provide the exact questions/problems that they were struggling with, which allowed the tutors to prepare in advance for the session. This made the sessions resemble an appointment service, which while common in other MSCs, was not common in the MLC at the time. Such a service had advantages and disadvantages, as elucidated by a previous tutor.

“The online booking system worked well, and there was rarely an issue with the meeting links. As students had to be (semi-)prepared, this meant I wasn’t going in blind which I personally appreciated. As an individual, I would rather spend time preparing to properly help a student in need than trying to remember ‘on-the-fly’. However, it was often a challenge to gauge how well a student was grasping the information and their own personal level of confidence with the problems and the subject at hand.” - Dr Aoife Hurley: tutor in the MLC from September 2021 to August 2022.

In order to facilitate teaching online, tutors were provided with writing tablets, which they could use to write on Microsoft Word or Microsoft PowerPoint while sharing their screen with the student. Since the return of in-person teaching in 2022, the role of the tutor has shifted back to an in-person one. The sentiment of the current tutors mirrors

those of many of the previous tutors especially around the support they receive and the benefit they get.

“Working in the MLC has been great experience for me. It is rewarding to help a student who is struggling with a topic and guide them to a place of understanding. My time in the MLC has given me a perspective on the mathematics that students do across the whole university and I look forward to learning more in my time at the MLC.” - Mr Brendan Lowry: Current tutor of the MLC (as of February 2026).

4. OUTREACH AND RESEARCH

As demonstrated throughout this article, staff in the MLC have conducted a significant amount of research (see [2, 3] for recent publications) and been involved in several outreach programmes (for example the Leaving Certificate help-desk or the DLSH project). In this section, we briefly highlight some additional projects not mentioned previously and we elaborate further on the extensive diagnostic testing carried out at the University of Limerick, which was mentioned in Section 3. We begin with the latter, as this forms a major piece of the research conducted by the MLC, particularly in the early years.

To recall, each diagnostic test consisted of a 40-question test administered to science and technology students in their first mathematics lecture at university. Students were not made aware of the test prior to taking it and completion of the test was done voluntarily by the students without the use of a formula and tables book or a calculator. The questions were open ended and were a mixture of Junior Certificate and ordinary-level Leaving Certificate questions¹. Students were given 45 minutes to complete the test and a rough work column was provided on each page. A ‘Don’t Know’ box was included after each question and students were encouraged to use this rather than guess. One point was assigned to each question with an all-or-nothing marking scheme. Since calculators were not permitted, students had to rely on their fundamental knowledge of mathematical procedures. Students who scored less than 20 on the test were deemed ‘at risk’ and were recommended to attend the MLC support tutorials for their respective modules. What made the diagnostic tests such an important research tool is the database that was created over the course of the twenty years the test was administered. Several journal articles were published (see [12, 36, 37, 8] for example) using the data from the diagnostic tests and two researchers had the data from the diagnostic tests as a key part of their PhD theses [6, 9].

In addition to the diagnostic testing, Dr Fitzmaurice, who was manager at the time, adapted the front-end tutorials mentioned in Section 3 into a bridging course called “Head Start Maths”; a voluntary mathematics revision course that runs in August, before students start in the university. Dr Fitzmaurice created the course by using her lecture notes from the “Access Course”, which was a one-year course offered to mature students who, upon completion, usually started on a degree programme in the university. The funding for the project was acquired through a secondment from **sigma** in the UK, with Prof. Duncan Lawson supervising the project. This is evidence of the close ties the MLC has, and continues to have, with **sigma**. Furthermore, in 2008, Dr Fitzmaurice contributed an article on the “Head Start Maths” programme to the proceedings of the Centres of Excellence in Teaching and Learning - Mathematics, Statistics and Operations Research conference (referred to as the CETL-MSOR conference) [11]. The CETL-MSOR conference is a major annual mathematics-education conference and, in 2024, it was hosted in the University of Limerick with staff in the MLC

¹The Junior Certificate is a state examination completed around the age of 15. The Leaving Certificate is a state examination completed at the end of secondary school.

constituting a large part of the organising committee. “Head Start Maths” began as a one-week revision course, but was extended to a two-week course following feedback. This service, which is administered by the MLC, is still running in 2026.

Another project administered by Dr Fitzmaurice was “Maths Casts”. These were short, recorded screen casts developed to explain specific topics to students. Dr Fitzmaurice acquired funding from the Quality Department in the University of Limerick to complete this project and she conducted the project with Prof. Tony Croft from Loughborough University in England and Prof. Birgit Loch from Swinburne University of Technology in Melbourne, Australia. Dr Fitzmaurice stated that the rationale behind this project was that help for the same topics was being requested consistently in the MLC. She states, “*domain and range used to make me want to quit my job, I knew I was going to have the first two weeks explaining this over and over.*” Hundreds of videos were created as part of the “Maths Casts” project and these were amalgamated with other similar videos across Europe on the European Virtual Laboratory of Mathematics. Dr Guerin was also part of the project before working at the MLC.

As the first mathematics support centre in Ireland, the MLC has close ties with many of the other centres in Ireland. In particular, the support centres in University College Dublin, Maynooth University and the University of Galway were all established following consultation by their managers with the manager of the MLC. The close ties between support centres on the island of Ireland culminated in 2009 with the founding of the Irish Mathematics Learning Support Network (IMLSN). Several managers and tutors from the MLC in the University of Limerick were/are on the IMLSN committee. To conclude this section, the author points to [1] for a comprehensive account of the development of MSS on the island of Ireland and, in particular, to [1, Figure 2], which shows the founding timeline for each MSC on the island up to 2016.

5. FUTURE OF THE MLC AND MATHEMATICS AND STATISTICS SUPPORT

In this section, we speculate on the future of the MLC in the University of Limerick. For this, the author relied on the interviews with Dr Walsh and Dr Guerin, the current directors of the centre. However, much of what Dr Walsh and Dr Guerin said was echoed by many in the MSS community.

The main theme that surfaced with regard to the future of the MLC and indeed MSS support in general was GenAI. Both Dr Walsh and Dr Guerin noticed a significant drop in attendance numbers in the second semester of the 2024/25 academic year (i.e., January to May 2025). The centre had seen a drop in attendance numbers after COVID-19, however this was attributed to the increase in the online support resources developed between 2019 and 2021. By the first semester of the 2024/25 academic year, (i.e., September to December 2024), “*things were starting to get back to normal*”, as commented by Dr Guerin. Both Dr Walsh and Dr Guerin speculate, as the author suspects many in the MSS community do, that the cause of the attendance drop is due, at least in part, to the proliferation of GenAI in education. Dr Walsh comments that “*AI is inevitably already a large part of how students study.*” However, an interesting question is, can students rely wholly on the online resources and GenAI in order to get them through their degrees? For some students, Dr Guerin believes the answer is affirmative: “*For some students the online [MLC support] and AI is enough and thus we are not seeing them in the drop-in any more*”. However, she points out that: “*For some modules, [students] have always had fully worked solutions [for their tutorials], but they still came in [to the drop-in centre]*”. Indeed, this point is evidenced by the experiences of Dr Walsh and Dr Guerin. Dr Walsh commented that “*I have students saying [to me in the drop-in centre] that AI taught me this, but they have no idea what the output is*”. Dr Guerin concurs saying, “*We still get students in [the MLC] saying I looked it*

up on AI and I couldn't understand it. So, they still do come in [to the centre]". This indicates that while GenAI may be having a major impact on MSS services, there is still space for MSCs. Dr Walsh comments that *"AI tools can be a fantastic learning resource, but I do think that students, particularly service-mathematics students who are struggling, need to speak to someone in person about the difficulties that they are having"*, while Dr Guerin commented that she believes *"MLC support and AI as being integrated into the provision of MSS in the future"*. This sentiment is echoed in a recent study at a university in Norway which indicates that while students generally find explanations provided by AI easy to understand and helpful, a majority still prefer human explanations [13]. This study shows that MSS is still valued by students. The author received the following statement from the **sigma** network.

It is inevitable that GenAI will impact on both the provision of maths and stats support and the way that students engage with it. Maths and stats support providers should seek to harness the power of GenAI and the support it can give students on a 24/7 basis and enable them to use it effectively. We firmly believe that maths and stats support is fundamentally a human endeavour and that, good though GenAI is and will become, there will always be many students who will respond best to human to human interaction. Credit: Mark Hodds (Chair, **sigma** network) and Duncan Lawson (Director, **sigma**, Coventry University). [Received: January 2026].

The author also received the following statement from the committee of the IMLSN.

GenAI is already influencing how students seek MSS, with some students possibly using it instead of, or alongside, visiting support centres. As GenAI becomes an everyday tool for students, its use in study will inevitably feel normal. As usage increases, MSS may need to place greater emphasis on reasoning and critical thinking, and shift towards supporting students to critically evaluate AI-generated work. It is important that it is used to enhance learning rather than become a substitute for it. Credit: Committee of the Irish Mathematics Learning Support Network. [Received: February 2026].

6. CONCLUSION

It is clear that the MLC at the University of Limerick has had a significant impact on both the students and staff of the University of Limerick over the past 25 years.

"[Working in the MLC] was a valuable experience in terms of helping students along on their mathematics journey. The impact was (and still is) huge since these students rely on the MLC as an essential support within their [University of Limerick] degree." - Dr Kevin Burke: tutor in the MLC from January 2011 to December 2014.

It is also clear that the MLC has changed a lot over its 25 years. The foundation of the centre was a delicate procedure that relied on support from many people and the centre's survival was not a certainty until years after its foundation. It was only through the dedication and hard work of several people that the centre became what it is today.

"The story of the Maths Learning Centre at the University of Limerick is an example of the best kind of innovation in higher education: evidence-based, discipline-led. I was lucky to have had the chance to work with Prof. John O'Donoghue to help realise the vision, but all the credit goes to him and his colleagues at the centre and in the department. What a legacy." - Prof. Sarah Moore: previous Dean of Teaching and Learning and Associate Vice President Academic at the University of Limerick.

Funding was the main struggle of the centre in the 2000s, with the centre not securing a reliable source of funding until it came under the Centre for Transformative Learning

in 2012. In the 2010s, staffing and space proved a major issue. Student engagement with the centre saw a dramatic increase and this coincided with a reduced number of available tutors. The end of the 2010s also saw a shift towards online support, which would be followed by a further online shift in the 2020s. While this shift from in-person to online led to a decrease in the in-person student engagement, the development of GenAI has had perhaps an even greater effect. On the question of GenAI and what lies ahead for the MLC, no one can be absolutely certain. However, hopefully this article has shown that the MLC in the University of Limerick, and MSS in general, has proven itself to be an adaptive service that has already faced and overcome many challenges, and there is much hope and optimism within the community that MSS will continue to do so into the future.

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APPENDIX

Here, we provide the questions that were provided to the previous managers of the MLC ahead of their respective interviews.

1. How did you initially get involved in the MLC?
2. How did the MLC develop between when you took over as manager and when you left the position?
3. What caused you to pursue these developments?
4. What challenges did the MLC face during your time as manager and how did you overcome them?
5. How did MLC student engagement change during your time as manager (more/fewer students, the module cohorts that looked for help, online vs in-person, the number of walk-in hour, etc.)?
6. How did you handle the funding of the MLC during your time as manager?
7. Were there any particular metrics that were influential in securing additional funding/support?
8. How did/do you measure impact and effectiveness of the MLC?
9. Did/Do you conduct tutor training with staff, and how did/do you do this?
10. How did/do you recruit tutors?
11. How did/do you collaborate with other departments (e.g. Maths and Stats etc.)?
12. Is there anything you would change about the MLC if you could? And why?
13. How did technological developments impact on the MLC?
14. What is some of the best feedback you have received about the MLC, and some of the negatives?

Prof. O'Donoghue received a slightly amended list of questions that included questions 7 - 14 from the list sent to previous managers and the following:

1. Why did you decide to set up the MLC/what motivated you to do so?
2. Did you look at similar centres in other universities when setting up/developing the MLC?
3. Who was the MLC originally aimed at, as in what kind of students (year/course/etc.)?
4. What were the challenges in setting up the MLC?
5. Who assisted in setting up the MLC - such as the maths department, government grants, etc?
6. How was the MLC received when it opened and how did you justify keeping the MLC open after the original funding ended?

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