

The Irish Mathematics Support Network: Its Origins And Progression^{*}

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Abstract

In this report we will present an overview of the establishment and subsequent development of the Irish Mathematics Support Network. We will briefly mention the reasons behind the foundation of the network and we will expand upon the aims and outcomes of our activities and projects in detail. We will discuss our activities in terms of our main goals; meeting the challenge of providing support for the wide range of students studying mathematics at third level and providing suitable and shared resources to help the consolidation and expansion of mathematics support services on a wide basis nationally.

Keywords: Mathematics Learning Support, collaboration, research, effectiveness.

* Project Report. URL: <http://ojs.aishe.org/index.php/aishe-j/article/view/00051>

1. Introduction

There is widespread concern about the numbers of students who have basic mathematical problems. Recent reports contain detailed analysis of these issues in the teaching and learning of Mathematics at second level in Ireland (Hourigan & O'Donoghue 2007; Lynch et al. 2003). Some of the main factors listed include: bad publicity for Mathematics, negative attitudes towards the subject, little understanding of the context or background of Mathematics, rote learning. The National Council for Curriculum and Assessment review (2005) and Cosgrove et al. (2004) have highlighted possible impacts of these problems. The Organisation for Economic Co-operation and Development report (OECD 1999) discusses the impact that this has when these students enter third level. Low attainment in Mathematics is cited as a contributing factor in low enrolment and retention rates in science and technology courses, (OECD 1999; IDES 2002). There is also significant international research on these issues (Picker & Berry 2001).

The provision of mathematics learning support is one response from third level institutions to try and address these issues. The main aim is to assist students in overcoming their mathematical difficulties. Mathematics learning support is also active in helping students with different challenges and backgrounds such as Access, Disability and Mature students and aims to provide a better mathematics learning experience for students from all these backgrounds. The rapid development of Mathematics Support and Learning Centres is well documented, (Perkin & T. Croft 2004; Gill et al. 2008). Several studies have investigated the effectiveness of support centres (Mac an Bhaird et al. 2009; Pell & T. Croft 2008; Dowling & Nolan 2006). Organisations such as NCE-MSTL (The National Centre for Excellence in Mathematics and Science Teaching and Learning¹) based in UL and **sigma** (The Centre of Excellence in Mathematics and Statistics Support²) based in the UK have been established to promote and expand, amongst other things, the area of mathematics learning support. For example, **sigma** has helped establish mathematics support networks (hubs) in various parts of the UK.

An open meeting of those involved in mathematics learning support and research in mathematics education in Ireland took place in the National University of Ireland Maynooth (NUIM) in February 2009. The aim was to establish an informal network to facilitate easier communication within the community and allow for greater collaboration and joint research opportunities. The event was well attended by representatives of most third level institutions in Ireland and expert opinion and advice was provided by members of the NCE-MSTL and **sigma**. It was unanimously decided at the meeting to proceed with the establishment of the network. An email vote was subsequently collated by Dr. Ann O'Shea (NUIM) and the following members were appointed to the Irish Mathematics Support Network committee for an initial two year term: Olivia Gill, University of Limerick (UL); Kevin Jennings, National University of Ireland Galway (NUIG); Ciarán Mac an Bhaird (NUIM); David McCarthy, Dublin

1 <http://www.nce-mstl.ie/>

2 <http://www.sigma-cetl.ac.uk/>

Institute of Technology (DIT); Eabhnat Ní Fhloinn, Dublin City University (DCU); and Ciarán O'Sullivan, Institute of Technology, Tallaght (IT Tallaght). Máire Ní Ríordáin, a representative from the NCE-MSTL, was also selected to act as a liaison between the committee and the national centre. This position is currently held by Niamh O'Meara.

The members of the committee met in DCU in March 2009 to determine the initial objectives of the network. It was decided to investigate the most pressing issues in terms of the provision of mathematics support as well as promoting the network on a national and international basis. To this end the committee agreed on the following: the development of a common group emailing list, and a website for the network; an annual programme of workshops and conferences which would discuss the most relevant topics of concern; the design and implementation of a national survey of mathematics learning and support services.

The developments to-date in each of these areas are outlined in the sections that follow. To pursue the objectives in these areas, some initial funding for the establishment and development of the network (including funding for workshops and conferences) was applied for and received from the All-Ireland Society for Higher Education (AISHE³), the NCE-MSTL, the Mathematics and Statistics Service Teaching (MSHE) Community of Practice within the NDLR (National Digital Learning Resources⁴) and **sigma**.

The committee meets formally each year to discuss various issues concerning the network. At the latest meeting in NUIM in June 2011 it was decided to change the name of the network to the Irish Mathematics Learning Support Network.

2. Development of a mailing list and website

An emailing list⁵ has been established (principle organiser Eabhnat Ní Fhloinn) in consultation with experts from the NDLR. This has allowed the easy dissemination of details (e.g., conference announcements and research proposals) and allows everyone interested in mathematics support to keep updated with events. Our emailing list has also been added to lists in the UK for greater awareness of activities there. The network now has a considerable national and international profile and which was reflected by the international attendance at the recent workshops; see section four for more details. Several members of the committee have been awarded secondments with **sigma** and visit the UK on a regular basis to promote the role of mathematics support in Ireland and collaborate on relevant research.

The network website⁶ has been set up (principle organiser Ciarán Mac an Bhaird) in consultation with the Senior Technical Officer in the Department of Mathematics & Statistics at NUIM. The website contains details of the network including previous and future events, a list of resources for students and staff, an up-to-date description of research and investigations in

3 <http://www.aishe.org/>

4 <http://www.ndlr.ie/>

5 irishmathsupport@gmail.com

6 <http://supportcentre.maths.nuim.ie/mathsnetwork/>

the area of mathematics learning support and education, a list of relevant websites, and a list of national and international contacts. There is also a news section on the main page where members from various institutions will be encouraged to place monthly updates on the methods that they employ to provide mathematics learning support. The website will be announced at a number of national and international conferences in August and September 2011 and an official launch will take place at the annual workshop in December 2011.

3. Annual Workshops.

A decision was also made at the initial committee meeting in March 2009 that the network would take over the running of the annual Irish Workshop on Mathematics Learning and Support Centres in order to give it a more formal and secure footing in the calendar of mathematics support events. The first workshop took place in 2006 in DIT, and since then, it has been hosted by UL, NUIM, DCU and NUIG. The aim of the workshop is to provide a forum for discussion and analysis of the most pertinent issues in mathematics learning support in Higher Education and has been instrumental in bringing together all participants in mathematics support in Ireland. It is a one-day event with no registration fee in order to make it accessible to as many people as possible. Previous workshops had dealt with recent developments in the field of mathematics learning support as well as evaluating the effectiveness of such support and further details are available ([Mac an Bhaird & O'Shea 2009](#); [Ní Fhloinn 2010](#)). We present precise details of the 2009 workshop and an overview of the 2011 workshop in the following subsections. A more detailed description of the 2011 workshop in NUIG is being considered for submission elsewhere.

3.1 'The Use of Technology in Mathematics Support' 4th Annual Irish Workshop on Maths Learning and Support Centres Dublin City University, 4th December, 2009.

20 registered speakers and approximately 60 people attended the event. It was very successful with participants coming from all over Ireland and the UK. Speakers reviewed a wide range of different technologies and also addressed core issues such as the relative value of computer-assisted learning and the optimum manner in which technology can be integrated. A full description of the event is available ([Ní Fhloinn 2010](#)) and a brief review highlighting the key points raised is included below.

3.1.1 2009 Workshop Theme

For mathematics support centres, or other support initiatives, funding is often critically low and hardware or software options often come with a considerable cost attached. It can be of particular financial benefit to determine the suitability of various technologies based on colleagues' experiences. It is also invaluable, in terms of time restrictions and costs, to learn about the efficacy of open-source software or freely-available resources. The workshop also provided a platform for those developing resources to report on progress made to date and to seek suggestions from the mathematics support community as to how to improve existing software to better suit their needs.

3.1.2 2009 Keynote Talk

The keynote presentation was given by Martin Greenhow from Brunel University. The title was 'Setting online questions in mathematics (and beyond): issues of pedagogy and technology'. The speaker focused on the use of technology for online learning and assessment purposes. Specific details were given about the Mathletics⁷ package, which consists of computer-aided assessment questions created using QM Perception. The speaker, drawing on his considerable experience in this field, emphasised the importance of correctly structuring questions in order to maximise the learning benefits for the students involved. For example, embedding meaningful feedback within each multiple-choice question is strongly encouraged, so that the student can experience such quizzes as interactive learning processes and be made aware of particular errors they have made while they are attempting the quiz. Interestingly, certain students appeared to deliberately give the wrong solution to some questions so that they could read the feedback provided. The speaker also addressed various ways of marking multiple-choice quizzes, such as attaching certain weight to the marks involved based on how confident the students profess themselves to be in their responses. He discussed the benefits of getting students to set questions, allowing them to set the context to suit their own situation and highlighted the importance of getting students to discuss the problems. Finally he provided an initial analysis of exam grades noting that students who were exposed to Computer Assisted Learning (CAL) achieved a 5% better grade on average than those who had not used CAL.

3.1.3 2009 Contributed Talks

The contributed talks covered a wide range of topics within the technological theme including dealing with issues of student retention and engagement, and the development of RLO's. It is very clear that there are a lot of common issues and developments within this area of mathematics support and this highlights the importance of the network and the possibility of collaboration and the dissemination of ideas.

3.1.3.1 Shazia Ahmed & Lorna Love, University of Glasgow, "Personalised Learning through Innovative Use of Technology."

The positions of Mathematics Advisor and Study Support Co-ordinator have recently been created in the University of Glasgow with the aim of improving student retention. Students entering university take a compulsory, zero-credit Mathematics Skills Test, which aims to identify gaps in their knowledge. Subsequently, they can avail of support in the form of one-to-one help through the Student Learning Service or peer-assisted learning sessions. The virtual learning environment, Moodle, along with mobile technology, is used as a more personalised form of supporting students, with students able to book appointments directly via Moodle and being reminded of these appointments via text to their phones. The speakers also highlighted the benefits of an introductory lecture which addresses the biggest fears and challenges for First Year students and has 2nd and 3rd year students present to answer queries.

7 <http://people.brunel.ac.uk/~mastmmg/>

3.1.3.2 *David Doyle, Institute of Technology, Sligo, "Using Technology to Increase Active Engagement with First Year Maths."*

This speaker concentrated on the use of Moodle with a group of first year Science students, focusing particularly on a series of online mathematics quizzes which aimed to increase student participation and engagement with the material. A number of marking approaches were tried with different cohorts: initially, the quizzes were used as formative assessment only, with no marks assigned, but this attracted few attempts by students; subsequently, students were awarded marks once they achieved 80-100% but most attempts were made around exam time; finally, students had to score 100% in each quiz within two weeks of lectures finishing in order to obtain continuous assessment marks. The final approach resulted in greater student participation, more attempts per quiz and an improved attitude towards the quizzes. The talk highlighted the importance of flexibility towards the students' needs when providing additional resources.

3.1.3.3 *Leslie Fletcher, Liverpool John Moore's University, Sue Milne, ELandWeb Ltd, Shazia Ahmed, Glasgow University and Paul Neve, Kingston University, "The FETLAR Project – Open Educational Resources and E-Assessment Tools for Mathematics."*

In this talk the speakers gave a brief overview of the FETLAR project. FETLAR (Finding Electronic Teaching, Learning and Assessment Resources⁸) is a UK Higher Education Mathematics community project, jointly funded by the Higher Education Authority (HEA) and the Joint Information and Systems Committee (JISC) under the Open Education Resources Programme, and managed by the Mathematics, Statistics and Operations Research (MSOR) network. FETLAR aims to "collect, create and collate" e-learning resources to help students improve their mathematical skills. Currently, FETLAR has built upon a number of existing projects, such as QTI Tools, MathAssess and STACK in order to deliver dynamic assessments as part of their content. The speakers also gave a brief demonstration of the resources collated to date.

3.1.3.4 *Noel Gorman, Martin Marjoram, Donal Healy, Ciarán O'Sullivan and Paul Robinson IT Tallaght, "The Use of Technology in Mathematics Support – Approaches Used and Lessons Learnt at IT Tallaght."*

This talk addressed four different approaches to mathematics support using technology: namely the use of CALMAT for tutorial support; Moodle-based "Key Skills Testing" in mathematics; the use of MapleTA for learning, testing and assessment; and the use of an e-book (A. Croft & Davison 2009) as a blended learning solution for mathematics revision for potential pre-entry mature students. The speakers presented evidence which suggests that the use of technology can promote active learning in mathematics; that the effectiveness of the technology used depended on the profile (age, motivation) of the students involved; and that suitable cognitive scaffolding must be provided to assist students to reflect appropriately while using technology to enhance learning.

8 <http://www.fetlar.bham.ac.uk/>

3.1.3.5 Paddy Johnson & Tim Brophy, NCE-MSTL, "An Introduction to the Dynamic Mathematics Software GeoGebra."

During this presentation, the workshop participants were given a step-by-step guide to creating applets using the free dynamic mathematics software package GeoGebra⁹. The speakers started by demonstrating several existing applets from the NCE-MSTL website, and then the main features of the package were introduced and a number of useful shortcuts explained. The strength of the package's ability to link aspects of geometry, algebra, calculus and statistics was emphasised, as this allows students to observe mathematics in motion, for example they can see the visual effects of altering terms in an equation. The speakers also highlighted the number of hits that their online resources receive outside office hours, reinforcing the need for flexible "24-7 support" supplied by technology. The NCE-MSTL promotes the use of GeoGebra at all levels in the Irish school system.

3.1.3.6 Samuel King, Loughborough University, "Evaluating the Impact of Response Technology on Student Engagement and Achievement."

This speaker focused on the impact of response technology (also known as clickers or electronic voting systems) on a group of undergraduate students from the Automotive, Aeronautical and Mechanical Engineering departments in Loughborough University. The study incorporated several different facets including; observations, one-minute questionnaires, longer questionnaires, interviews and focus groups. Analysis of the study showed that although the students were very positive about the devices, with 80% of those surveyed saying that the handsets were "useful" or "very useful", there was a negligible impact on attendance and students' overall grades.

3.1.3.7 Ciarán Mac an Bhaird, NUIM, "The Challenges and Benefits of Using Technology in Mathematics Support."

This presentation reported on the level to which technology is used in providing support for mathematics students. First year students who fail a mathematics proficiency test are enrolled on a mathematics proficiency course on Moodle. The course involves text, online videos and quizzes each week. There is also an equivalent mathematics foundation course for non-mathematics students. Follow up support workshops are run every week for students struggling with course material. In these workshops, the tutor uses Symposium (a touchscreen technology) to present the material, meaning that the notes written during the session can be directly transferred onto Moodle. Students do not have to take notes but are free to simply listen to the tutor. Students have responded very positively to this approach. The speaker identified the initial cost of the unit as a potential disadvantage. In addition to these workshops, screencasts and podcasts are also being developed as extra resources for students. The issue of getting students to actively engage with these supports was also raised.

9 <http://www.geogebra.org/>

3.1.3.8 Alun Owen, Loughborough University, "Two Projects for Enhancing the Provision of Statistics Support."

The main focus of this presentation was to provide an update on the progress of the statstutor project, which is an online resource aimed at supporting non-specialist students with understanding statistical analysis. It is aimed at both undergraduates and postgraduates from a range of disciplines. It forms part of the mathcentre¹⁰ resources, and consists of topic-based resources using the STEPS Glossary¹¹ as a basis as well as case studies based on RSS CSE (Royal Statistical Society Centre for Statistical Education¹²) materials. The speaker invited input and collaboration from any interested parties during the development of this resource.

3.1.3.9 Ewan Russell and Steve Joiner, sigma-CETL, Coventry University, "LEGO NXT as a Device to Enhance the Teaching and Learning of Mathematics."

The speakers gave an overview of the use of LEGO NXT in mathematics-specific activities. They provided details and demonstrations of trigonometry activities developed by summer placement students in **sigma**. One such example was the navigation of a track using a robot, requiring students to calculate various angles and lengths in order to keep the robot on-track. In order to do so they needed to be familiar with material such as similar triangles and the sine and cosine rules. They also highlighted operational issues, for example although Java, ROBOTC or NXT-G can be used to program the robot; ROBOTC is about 130 times faster than NXT-G. Overall, preliminary trials of the activities have been positively received, with 73% of students involved saying they "agree" or "strongly agree" that the activity was enjoyable.

3.1.4 Conclusions from 2009 Workshop

The workshop showcased some of the valuable uses being made of technology in mathematics support both in Ireland and the UK. A broad variety of software options were reviewed and their relative merits explored. It is clear that the use of technology has the potential to allow us to provide more support to students outside normal hours of operation. This would help combat over-riding issues such as timetabling and personnel resources, and so continued collaboration in this area is essential. It is both encouraging and commendable to note the number of high-quality existing resources (and those currently in development) that are made freely available for use in mathematics education, and this is a trend which we hope will continue for many years to come.

10 <http://www.mathcentre.ac.uk/>

11 <http://www.stats.gla.ac.uk/steps/glossary>

12 <http://www.rsscse.org.uk/>

3.2 ‘Maths Support: How Much Should We Provide... and When?’ 5th Annual Irish Workshop on Mathematics Learning and Support Centres, NUI Galway, 4th February, 2011.

The workshop addressed the topic of intervention with students, in particular the lengths to which we should go to intervene and the merits of different types of intervention. This is a very relevant topic as resources and funds are being stretched to the limit. Identifying the most efficient and beneficial ways to concentrate our expertise is of the utmost importance. This topic is of particular relevance as many 3rd level students are adult learners (mature students) and having been out of the formal education system for some time these students often rely on mathematical support services to help plug the gaps in their knowledge and bring them up to speed. The workshop was organised by Maura Clancy and Kevin Jennings, NUIG. Further detailed information is available at the conference website¹³.

3.2.1 2011 Keynote Discussion

The keynote discussion material was provided by Professor Duncan Lawson of Coventry University who forwarded a paper which was distributed to delegates at the conference and designed to promote and stimulate discussion on the conference theme. He was unable to attend, but he sent on a powerpoint presentation with voice over which was presented by Maura Clancy (NUIG) and Ciarán Mac an Bhaird (NUIM). The paper and presentation provided a platform for discussion on the growth of mathematics support provision and the increase in participation and uptake of services provided, and particularly an opportunity to reflect on what was termed ‘the question’, i.e., how much support is enough? Lawson stated that it is a very difficult question to answer and instead of providing a definitive answer, he provided a framework from which the learning support community could draw to discuss as a first step towards answering ‘the question’. This presentation was successful in sparking a lot of rewarding debate between delegates which the organisers are writing up and hope to have available in the near future.

3.2.2 2011 Contributed Talks

There were six additional presentations, five from Ireland and one from the UK. The talks covered a wide range of topics which highlighted the complexity and relevance of the conference theme, details of which are outlined below.

3.2.2.1 Lisa O’Keeffe, Olivia Gill and John O’Donoghue, UL, “Should Maths Learning Centres be more proactive?”

In this session, the speaker discussed the evolving role of Mathematics Learning Centres as they move from what was a reactive role that addressed underpreparedness and gaps in knowledge to a more proactive role forced upon MLCs by what the authors termed the ‘Drivers of Change’, such as government policies relating to mass higher education and the drive for a smart economy, the changing student profile and Project Maths. The talk was

13 <http://www.maths.nuigalway.ie/sums/IMSN/abstracts.shtml>

concluded with suggestions of ways in which MLCs can be more proactive in anticipating and dealing with these pressures.

3.2.2.2 Ciarán O'Sullivan, Donal Healy and Paul Robinson, IT Tallaght, "Mathematics Support Centres: The need for early and contextualised supports".

In this session the nature and, in particular, the timing of support initiatives were discussed. The speaker talked about insights gained from a review of first year student retention over a 6 year period in IT Tallaght and how this review led to significant changes in engineering course provision in the institution. The HEA report 'Study of Progression in Irish Higher Education' was also discussed, specifically how the report addresses the need for MLCs to tailor and align their facilities more closely with mathematics lectures/classrooms.

3.2.2.3 Ciarán Mac an Bhaird, NUIM, "Reactions to Student Engagement with Mathematics Supports".

In this talk an overview of the extra supports and initiatives introduced in the National University of Ireland Maynooth to target 'at risk' students who either do not engage with mathematics supports, or do so at a minimal level, was presented. Initiatives included subject specific workshops, online courses and a mentoring scheme which was run on a pilot basis over the academic year 2009/10. The pros and cons of the implementation of such a scheme were addressed. Additionally, a monitoring scheme which keeps tabs on student attendance and coursework obligations was outlined. Strategies pursued by the Department of Mathematics to reach that cohort of students who need mathematics support the most were also discussed. The presentation finished with a discussion on where to draw the line between providing support and getting students to help themselves.

3.2.2.4 Shazia Ahmed and Sue Milne, University of Glasgow, "MathAssess in Level 1 Biology and Geography".

These presenters discussed a suite of MathAssess QTI tools purposefully designed for creating, editing and delivering questions and tests with inbuilt facilities for the writing of mathematical expressions which are available from the FETLAR website at <http://fetlar.bham.ac.uk>, accessed 30th June 2011. They also gave an overview of a project at Glasgow University which has been funded to create a database of questions in Mathematics fundamentals which can be tailored for a wide range of mathematics intensive disciplines throughout the university. Training in the MathAssess QTI tools was also conducted and the speakers discussed the lessons learned throughout the whole process.

3.2.2.5 Maura Clancy, NUIG, "SUMS: having the students help us".

NUIG opened SUMS (Support for Undergraduate Maths Students) in February, 2009. The talk focussed on the organisation of the support centre and how it has embedded itself in the mathematics education of many students already. Two years on, the centre is an established resource for many students. A selection of case studies was presented as a means of reflecting on the advancement of the centre.

3.2.2.6 Nuala Curley, UCD, "Adapting Maths Support Centres to Webwork".

In this presentation the speaker talked about an increased use of online teaching resources. They mentioned research in neuroscience, the personal contact in maths support centres and the adaptation of WeBWork for use. The pros and cons of such an intervention were discussed in great detail as well as the implications for the maths support centre.

3.2.3 Conclusions from the 2011 Workshop

The workshop highlighted the importance of the level and timing of support provision. It is intended that a more detailed description of the discussions and outcomes will be available in the near future.

4. Projects

4.1 Design and Implementation of a National Survey of Mathematics Learning Support Services.

Most Mathematics Support and Learning Centres in Ireland have temporary funding so the issue of promoting the benefits of mathematics support on a national and institutional level is very important. The network committee decided to start a project to develop suitable questionnaires for all support centres to use and also investigate the best practice for analysing the questionnaires properly.

The network committee (principle organiser Olivia Gill) organised a one day workshop 'Irish Maths Support Network Workshop on Survey Creation and Analysis' in UL in June 2009. The morning session was devoted to the design of surveys/questionnaires and was conducted by Dr. Jean Saunders from the Statistics Consultancy Unit in UL. The afternoon considered methods for the analysis of questionnaires and consisted of two sessions. The first presentation introduced the use of the statistical tool Rasch analysis and was delivered by Dr. Ann O'Shea (NUIM), Dr. Sinéad Breen (St. Patrick's College, Drumcondra) and Dr. Joan Cleary from the Institute of Technology Tralee (IT Tralee). They presented results from their use of this technique to analyse data in several studies they have conducted and published. The second presentation focussed on the NVivo analysis system and was delivered by John Keogh, a PhD student in IT Tallaght. The event was very rewarding for the twenty participants and it has been invaluable to the network in developing a common questionnaire on Mathematics Support.

As a consequence of this workshop a pilot questionnaire was developed by the committee and distributed at the end of the academic year 2009-10, to students from NUIM, DCU, UL, IT Tallaght and IT Tralee. The initial feedback from these pilot questionnaires was analysed in summer 2010 and expert statistical advice received to ensure the validity and reliability of the questions. Appropriate adjustments were made and the questionnaire was issued to twenty two participating third level institutions for distribution during the second semester of the academic year 2010-11 to students taking first year mathematics modules. The questionnaires were completed in the following nine third level institutions in Ireland: DCU, IT Blanchardstown, IT Carlow, IT Tallaght, IT Tralee, NUIG, NUIM, UCD, and UL. The data is currently (June 2011) being inputted and preliminary results should be available by autumn 2011. This is the first common work of its kind between third level institutions in Ireland on mathematics learning support and we believe this collaboration and the outcomes will be extremely beneficial to the mathematics support and mathematics education community both nationally and internationally. The analysis of results will be submitted for publication. We hope to use the results from this analysis to provide further evidence of best practice in mathematics support to the relevant authorities in the quest for proper and permanent funding.

4.2 Evaluation of Diagnostic Testing.

Some additional projects are being investigated by members of the network as a consequence of our frequent meetings and discussions. For example, a questionnaire has been developed by UL, DCU and NUIM to determine students' perceptions of diagnostic testing. This has been distributed in DCU and NUIM and analysis of the data received is currently underway. The results will help us determine if any changes should be made to the way we present and implement diagnostic testing. This is very relevant as several institutions use the results of diagnostic testing to determine if students are 'at-risk' and tailor their services accordingly.

4.3 The Next Annual Workshop

The next workshop is scheduled for early December 2011; details will be announced through the mailing list and the website. The workshop will also host the election of a new committee and have a discussion on the direction and focus of the IMLSN.

5. Conclusions

The activities of the Irish Mathematics Support Network have been very rewarding, for example many third level institutions which are establishing support centres have mentioned the benefits of regular contact with their national and international colleagues. We feel that our objective of increasing awareness of the network and increasing co-operation and participation between interested parties for the common good of mathematics support has been very successful. The workshops have significantly increased the awareness of both existent and developing resources and many of these are being implemented by various centres.

Most support centres in Ireland have noted a significant increase in usage in the last few academic years and this has increased the pressure on staff to provide a comprehensive and effective service. This highlights the importance of the network and the objectives that it is trying to achieve. The partial funding the network receives from various bodies is very timely, greatly appreciated by the committee and has allowed us to investigate common and significant areas in mathematics support that would otherwise have proven difficult to consider. The network has also allowed for a greater synergy between support centres and colleagues in the various third level institutes involved.

6. References

- Cosgrove, J., Shiel, G., Oldham, E. & Sofroniou, N., 2004. A Survey of Mathematics Teachers in Ireland. *The Irish Journal of Education*, 35, pp. 20-44.
- Croft, A. & Davison, R., 2009. *Foundation Maths: With MyMathLab*, Harlow, England: Prentice Hall.
- Dowling, D. & Nolan, B., 2006. Measuring the Effectiveness of a Maths Learning Experience – the Dublin City University Experience. *Proceedings of the CETL-MSOR Conference*, pp. 51-54.
- Gill, O., Johnson, P. & O'Donoghue, J., 2008. *An Audit of Mathematics Support Provision in Irish Third Level Institutions*, Limerick: CEMTL, University of Limerick.
- Hourigan, M. & O'Donoghue, J., 2007. Mathematical Under-preparedness: The Influence of the Pre-tertiary Mathematics Experience on Students' Ability to Make a Successful Transition to Tertiary Level Mathematics Courses in Ireland. *International Journal of Mathematical Education in Science and Technology*, 38(4), pp. 461-476.
URL: <http://www.tandfonline.com/doi/abs/10.1080/00207390601129279>
- IDES, 2002. *Task Force on the Physical Sciences, Report and Recommendations*, Dublin: Irish Department of Education and Science, Government Stationary Office.
- Lynch, K., Lyons, M., Sheerin, E., Close, S., et al., 2003. *Inside Classrooms: a Study of Teaching and Learning*, Dublin: Institute of Public Administration.

- Mac an Bhaird, C., Morgan, T. & O'Shea, A., 2009. The Impact of the Mathematics Support Centre on the Grades of First Year Students at the National University of Ireland Maynooth. *Teaching Mathematics and its Applications*, 28, pp. 117-122.
URL: <http://eprints.nuim.ie/1870/>
- Mac an Bhaird, C. & O'Shea, A., 2009. Is Mathematics Support Worthwhile? An Overview of the 3rd Irish Workshop on Mathematics Learning and Support Centres. *MSOR Connections*, 9(2), pp. 52-59.
URL: http://eprints.nuim.ie/1869/1/9252_bhaird_c_and_oshea_a_mathssupport.pdf
- NCCA, 2005. *Review of Mathematics in Post-primary Education (a Discussion Paper)*, Dublin: National Council for Curriculum and Assessment.
- Ní Fhloinn, E., 2010. The Use of Technology in Mathematics Support: An Overview of the 4th Irish Workshop on Mathematics Learning and Support Centres. *MSOR Connections*, 10(2), pp. 55-58.
URL: http://mathstore.ac.uk/headocs/10249_fhloinn_e_techmathsupport.pdf
- OECD, 1999. *Measuring Student Knowledge and Skills: A New Framework for Assessment*, Paris: Organisation for Economic Co-operation and Development.
- Pell, G. & Croft, T., 2008. Mathematics Support—support for All? *Teaching Mathematics and its Applications*, 27(4), pp. 167 -173.
URL: <http://teamat.oxfordjournals.org/content/27/4/167.abstract>
- Perkin, G. & Croft, T., 2004. Mathematics Support Centres– the Extent of Current Provision. *MSOR Connections*, 4(2), pp. 14-18.
URL: <http://mathstore.gla.ac.uk/headocs/42supportcentres.pdf>
- Picker, S.H. & Berry, J.S., 2001. Investigating Pupils' Images of Mathematicians. In *Proceedings of the 25th Conference of the International Group for the Psychology of Mathematics Education*. pp. 49-56.
URL: <http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED466950>