ONLINE MATHEMATICS HELP CENTRES: UK AND IRISH AVAILABILITY

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Mathematics Support Centres are available in the majority of Higher Education Institutions in Ireland and the UK. Whilst the online presence of these centres appears to be increasing, there is little research to date which considers its breadth or effectiveness. In this paper we consider the results of a survey on the online presence of support centres in Ireland and the UK. We discuss the opportunities that arise from such a presence, the challenges that exist and what the results of the survey mean for individual practitioners and the wider mathematics support community.

1. Introduction

Mathematics Support Centre (MSC) is often the given name, though there are variations, for the unit within a Higher Education Institution (HEI) which provides Mathematics Learning Support (MLS). MLS is typically described as mathematical and or statistical supports which are available for students in addition to their lectures, tutorials and assignments etc. (Lawson et al., 2003). The availability of MLS has increased dramatically in recent decades and is now available in the majority of HEIs across Ireland and the UK (Ahmed et al., 2018, Cronin et al., 2016, Grove et al., 2019). Ongoing research is looking at the level of MLS provision in Germany (Schürmann et al., 2020) and the USA (Mac an Bhaird and Thomas, in preparation), and MacGillivray (2008) describes the situation in Australia.

Two key factors in the success of MLS have been the establishment of strong national and international collaborative communities of MLS practitioners, e.g. the Irish Mathematics Learning Support Network (IMLSN), the Scottish Mathematics Support Network (SMSN) and sigma (Network for Excellence in Mathematics and Statistics Support) (Croft et al., 2015), and a strong ethos that MLS should be appropriately evaluated to provide best practice based on research (Matthews et al., 2013, Lawson et al., 2019).

The MSC in Maynooth University was established in 2007 and, based on advice from other MLS practitioners, we established our own website. For further details on the development of this website, see Mac an Bhaird et al. (2020a, 2020b). In summary, it initially provided information on MSC services, and some links to external websites with resources. As the MSC became more popular, the website alsogrew, especially in terms of the range and detail of both internal and external resources. The website also contained links to resources on the institutional virtual learning environment (VLE) and to the MSC's social media accounts. Its progression was very similar to that laid out in the sigma best practice guide by Mac an Bhaird and Lawson (2012, p. 17):

2. Background and methodology

2.1. MSC websites and online presence in MLS literature

In this section, we review MLS literature which relates to the online presence of an MSC. By online presence, we mean anything we could find in the literature which refers to MSC websites and VLEs,

including online resources, social media etc., sometimes referred to as Information and Communications Technologies (ICTs). We only considered literature which referred directly to MSCs or MLS, and in almost all the literature that follows, references to online presence play only a small role.

L awson et al. (2002) is one of the earliest papers which pays specific attention to an MSC website. They refer to the staff intensive nature of MLS and their (Coventry University) introduction of a website in an attempt to improve the effectiveness of their services. The enhancement rather than the replacement of existing tutor support was a key point raised.

They describe website content which outline the MLS services provided in addition to online resources and assessment, and an email facility to allow students and tutors discuss mathematical problems. They close with a brief section on the 'Evaluation of Use', and this focuses mainly on the number of hits on various features of the website and the timing of these online visits throughout the academic year.

Coventry University's MSC website also features in the 2003 'Maths Support for Students' report by the Learning and Teaching Support Network (LTSN) MathsTEAM. Additional content here highlights the importance of creating awareness of the MSC website. It describes how the website featured as a standard learning resource link on the module pages of the institution's (recently adapted) VLE, and they recommend the sharing of resources due to the time intensive nature of their development. The role of the website as part of an MSC's services is also addressed:

'The website is only one part of the wide ranging support provided by Coventry University Mathematics Support Centre. Whilst setting up a website to make resources available electronically is reasonably straightforward, if this is done in isolation it may not provide a great deal of benefit to students. The website needs to be part of a larger support provision.' (LTSN, 2003, p. 51)

In 2010, Patel and Rossiter, who reported on student engagement with and awareness of the MSC at the University of Sheffield, included questions on online resources as part of their MLS student evaluations and also briefly describe the development of their website. 'An effort has been made to organise the mainly paper-based online resources in such a way as to enable students to get to topics quickly, and the authors are very encouraged to see that 8 out of the 39 students who made use of the support did so exclusively via the resources.' (Patel and Rossiter, 2010, p101).

The sigma guide for MLS tutors (Croft et al., 2011) had a short section dedicated to online resources and provided a list of resources, each with a brief informative overview. Also in 2011, one aim of a summer student intern MLS project in the University of Exeter was to create an online hub for students which would allow them to help each other. They state that 'Our aim was not to replicate the existing panorama of online resources for maths and stats, but to validate them through student review and build a framework for a sustainable student support community.' (Cooper et al., 2011, p. 41).

The HE STEM Guide (Lawson, 2012) mostly features MLS cases studies from five HEIs, and the level of detail provided on their online presence varies greatly. One institution refers to their website

address once, whereas three other institutions report a mix of 'operational data' such as opening hours, locations etc. (which one institution complemented via Twitter). Links to both external and internal resources, use of iPad in MSC for ease of access to online resources and assistance via email are also listed. The fifth institution, Coventry University, outlines a comprehensive suite of online supports, mostly described earlier, and also includes an 'in-house' recording studio which was used to make short videos made available to students through iTunes. However, the key point that comes through again is that 'The resource that students most value is the personal one-to-one support' (Lawson, 2012, p. 9).

In the sigma guide on setting up an MSC (Mac an Bhaird and Lawson, 2012), there are multiple references to the online presence of an MSC. For example, they mention MSCs using their VLE to organise appointments and 'institutions post the notes from these workshops onto their VLE, and also include relevant online resources. Some institutions are also using their VLE to provide online support on basic materials. This can be a very effective use of staff time and resources; however engagement levels are sometimes low.' (Mac an Bhaird and Lawson, 2012, p. 15).

They also refer to websites as one of many routes for MSC advertisement, they highlight the involvement of students in designing videos to promote MSC engagement, and they briefly describe physical and online resources. They emphasise the importance of sharing online resources amongst the wider MLS community:

In 2011 in Ireland, a large-scale student evaluation of MLS was carried out by a subcommittee of the IMLSN (O'Sullivan

et al., 2014). It featured responses from 1,633 first-year service mathematics students across 9 HEIs. ICT was the broad term used to cover online support/website, email questions service, CALMAT software etc. In 8 of the HEIs, students were asked to rate ICT, and there were 268 responses. Over 55% indicated that ICT enabled supports were quite or extremely worthwhile, and just less than 19% felt that they were not worthwhile. However, when compared with other face-to-face MLS services in this report, ICTs were the least positively endorsed. Coding of 112 additional open comments gave 5 main categories: satisfaction level with services provided (41%), issues with quality of materials/layout/ease of access (28%), prefer human help with mathematics (12.5%), did not know it was there (9%), and issues related to the time required to engage with online materials (9%). Based on the analysis of this data, the authors added a recommendation:

'Given that ICT enabled Supports play an increasing role in MLS services, the rating and comments would suggest that issues regarding the digital literacy skills of students and the practical issues of accessing the online materials/services provided require further consideration if these services are to be of maximum benefit to students. We recommend that: Further investigation be undertaken to explore how MLS providers can enhance the online resources and services available to students, and increase .

This recommendation indirectly led to our current study, and the impact of the 2014 IMLSN report has been quite significant in other ways. As a result of a separate recommendation, the IMLSN decided to conduct a survey of MLS provision on the island of Ireland in 2015 (Cronin et al.,

2016), and that survey had some questions which were specific to online support.

The 2014 IMLSN report also influenced the IMLSN's decision to have their 2015 workshop focus on maximising the benefits of technology in MLS (Cronin and Breen, 2015). At that workshop, there was a presentation on a prototype virtual online drop-in across three HEIs in Dublin. At that time, these HEIs were potentially going to amalgamate into one larger HEI. This virtual drop-in was reported on in full in Breen et al. (2016). Initially, they conducted surveys of staff and students in the three HEIs about delivery methods for MLS. They found that 71% of staff and 88% of students preferred exclusively or mostly in person support when compared with online. Only in one HEI did staff, and students indicate a preference for exclusively online MLS and this HEI was teaching several modules online. As a result of these findings and the recommendation from the 2011 IMLSN survey, the authors decided to develop an online drop-in service and 'hope[d] to replicate the in-person experience as much as possible in a virtual environment' (Breen et al., 2016, p. 12). They used Adobe Connect and a single session for all students, which allowed students to communicate with each other as well as with the tutor. They commented that 'Overall students were positive towards the concept of the Virtual Drop-in service. However, they felt that the technical issues that arose during the trials, such as feedback and slow connection issues, would need to be addressed in order for this service to be implemented successfully.' (Breen et al., 2016, p. 13).

2.2. Methodology

Given the prevalence of MLS provision in HEIs in Ireland and the UK, and the fact that no previous research has focused exclusively on the online presence of MSCs, we decided to have the majority of our survey in open format with a view to capturing as much data as possible. We developed a survey with 13 questions over three main sections, and we tested the survey layout and questions with colleagues in our institution who were not involved with the MSC or the research project. Based on their feedback, small adjustments were made, mainly to address points of clarity in relation to the wording of certain questions. All questions except 8, 9 and 13 had yes/no options followed by a space for the respondent to provide extra detail. Questions 8, 9 and 13 were open-response only. Ethical approval was granted in April 2018 and the final survey was distributed via IMLSN, SMSN and sigma mailing lists. These are the main mailing lists for MLS practitioners in Ireland and the UK.

3. Results

The survey had three parts, with the following very general headings (heading titles were not used in the survey): extent of online presence (Questions 1–3), data, advertisement and social media (Questions 4–7), and further MLS practitioner opinion (Questions 8–13). We will use this structure throughout this section, and n = 33 throughout unless otherwise indicated.
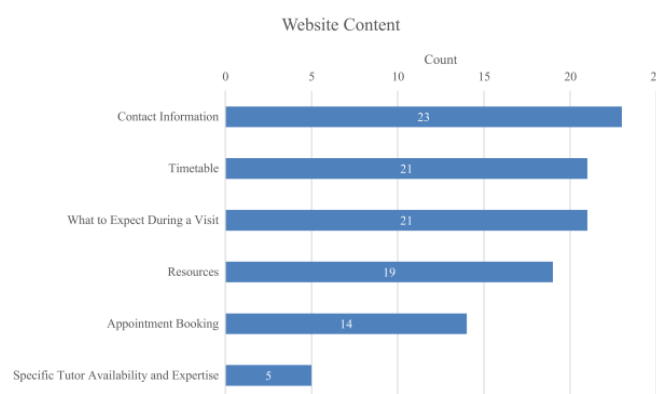

FIG. 1 Categories of response on content of MLS website ($n=27$)

3.1. Extent of online presence

In Question 1, respondents were asked 'Do you have a website for your MLS provision?', 27 selecting 'yes' and 6 'no'. All 27 who answered 'yes' elaborated on the content of their website, some giving multiple examples. See Fig. 1 for the six categories of response. Of the 19 who hosted resources on their website, 13 of these provided links to external resources, 8 offered resources developed by that institution, and 4 hosted quizzes or diagnostic tests.

Twenty-six of the 27 indicated that their website was tied to their institution's wider web presence 'We are limited in the design of the website as it must comply with our central [institutional] design policies'. Three of these noted that this created an obstacle with respect to their design and content provision as they were restricted by wider institutional policies 'We are constrained by digital media rules as to what can be hosted directly, how it is written and how it is linked together' and 'We see this a serious obstacle to advertising the service to current and prospective students. Work is ongoing to include an external facing webpage on the university website'. Only one MSC reported that their website was autonomous within its institution's web structures.

Twelve respondents indicated that their MSCs provided Skype appointments for students, though five then qualified this by saying that, whilst they have the facility in place, there had not been much uptake for these sessions 'We provide occasional Skype tutorials. However, they are not very popular and a little clumsy to set up. Email support/correspondence is more preferred by students but even this is negligible in comparison to physical support'. A further 5 of these 12 specified that Skype is made available only when a

student cannot attend a drop-in session, either due to disability, attending a satellite campus or being on an apprenticeship. Eight MSCs provided sessions using some form of virtual classroom such as Blackboard Collaborate, Adobe Connect, slack.com etc. 'now it is mainly responding to questions by email and I have occasionally used adobe connect to speak with students and answer questions'. Two of these eight indicated that these sessions were intended as a support for students in satellite campuses and one further respondent praised their usefulness as an out-of-hours support to students working full time jobs. 'Advantages here are that tutors can host sessions at 11pm-1am for example to suit student demand as so many students work fulltime jobs these days as well as studying full time. Students appraise these slack sessions as very helpful though anecdotally I feel this is because their exam query is answered quickly and efficiently - using the usual mentoring MSC model style of tutoring is not feasible via slack'.
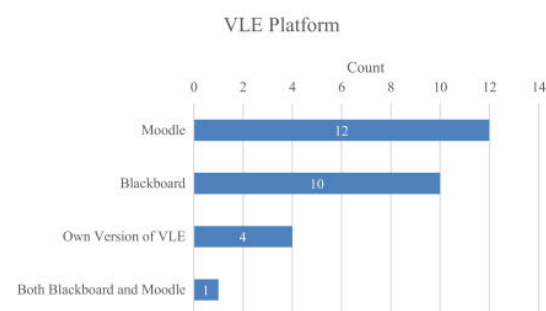

FIG. 2 VLE Platforms used (n=27).

3.2. Data, advertisement and social media

There were 32 responses to Question 4, 'Do you keep a record of the number of visits or uses to your ICT(s)?', with 11 indicating 'yes' and 21 'no'. Six of these 11 reported that they made use of their VLE's inbuilt tracking system, 2 used video view counters and 1 measured hits on their website 'Activity on the moodle support module was recorded as part of a

study a couple of years ago but no monitoring takes place now'.

Of the remaining nine who responded 'no', five commented that they did not collect this information nor did they have to means to 'No, Unfortunately we have to use a website that is organised and run through IT that we have no control over.' and 'No, it is technically very difficult to do as our VLE website is available for all [our] students and staff'.
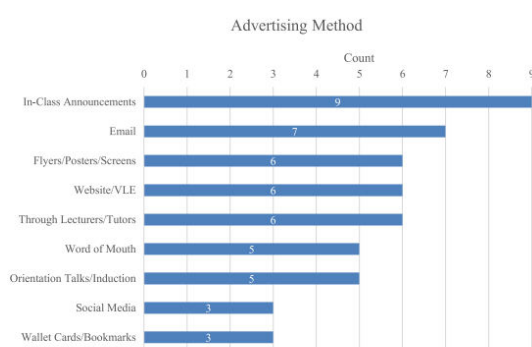

Fig. 3 Methods used to advertise ICT provision ($n = 25$).

Of the 25 respondents who indicated that they did use social media, 9 of them did not have their own dedicated social media account; instead, information is posted through a wider academic support or library social media page. The issue of institutional control is mentioned here again with two respondents remarking that social media usage is centralised to a university marketing team or equivalent body which makes the process of posting slow and difficult 'all online media is currently under the university control, which means that any tweet we want to put up has to go through the main channels and is quite slow'.

3.3. MLS practitioners' general feedback on ICTs

In Question 8, we asked 'Please briefly give your opinion on the importance and role of ICTs (those listed above and or others) as part of MLS provision', and 31

responded. The main categories of response are presented in Fig. 4.

Most respondents simply gave a short answer such as 'advertisement of resources' without giving their opinion on why this was important. However, comments in some of the categories gave additional detail. Of the 21 respondents who mentioned the provision of resources as an important role of ICTs, 7 of these responses were also coded in the category of those who considered relevant/reliable resources to be important 'I have selected resources for which I can guarantee the academic accuracy, and which are specifically relevant to students studying in my institution. Nowadays, students inevitably search answers online, plus an increasing number of students study online degrees, or from distant places, so ITCs are becoming increasingly relevant'.
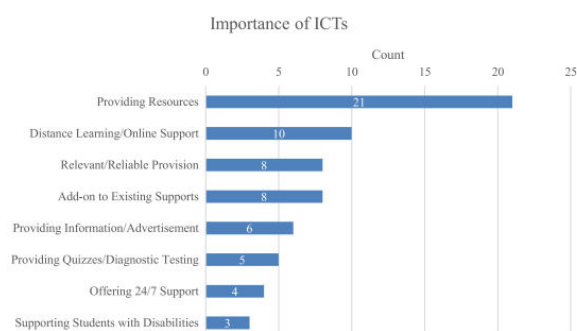

Fig. 4 Importance and role of ICTs ($n = 31$).

4. Discussion

All but one MSC in this survey had either a website ($n = 27$) or used a VLE ($n = 27$), and the majority ($n = 22$) had both. The most common use for these sites was for the dissemination of MSC operational information such as opening hours, tutor schedules, how to use the MSC etc. and is consistent with any descriptions we found in literature (Lawson et al., 2002) and suggestions in various MLS guidelines and reports (Lawson, 2012; Mac an Bhaird and Lawson, 2012; Nuffer, 2016). In our survey, operational information was more

likely to be placed on websites rather than on VLEs.

The situation with social media perhaps provides a good exemplar with which to close the discussion. Social media usage in MLS appears to have increased markedly in recent years. Its first mention in the literature was the use of Twitter for advertisement of services in one institution in Lawson et al. (2012). The 2015 survey of MLS in Ireland had one (of 25) HEI listing social media as a form of MLS. In our survey, 25 HEIs used social media as part of their provision, 20 indicated that they used it to advertise their services, and 2 used it to share resources. However, seven of the respondents referred to a general lack of engagement with social media and in nine of the HEIs social media usage was under central institutional control, and posting could be 'quite slow' as a result. Almost all social media usage was via Facebook (16) or Twitter (20). However, recent surveys have indicated a shift away by younger people from Facebook and Twitter towards other platforms such as Instagram and Snapchat (Anderson and Jiang, 2018). Two respondents referenced the use of Instagram, with one of these highlighting the effort involved to maintain it and the other stating that they had very few followers.

5. Conclusion and next stage

There are some limitations to this study. For example, the sample size was small (approximately 28% response rate from the MLS community in Ireland and the UK) and self-selecting, in the sense that practitioners who provided online MLS were probably more likely to answer the survey than those who did not provide online MLS. Furthermore, in one or two cases, it was not easy to categorise responses— for example, when

respondents said they responded by email to student queries, it was not clear if the queries were of a mathematical or operational nature. Nevertheless, we believe the findings have merit and can be built upon by the wider MLS community

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