

Small Grant: Maths Terms for British Sign Language

Deaf children in the UK who use British Sign Language (BSL) as their primary form of communication often have poor access to English and find it more difficult to write class and exam answers in school and university. There are concerns that there is insufficient specialist vocabulary to help students to learn and communicate technical details. In 2007, a BSL Glossary project was started at the Scottish Sensory Centre (SSC) at the University of Edinburgh that aims to create, define and develop BSL for Science, Technology, Engineering and Mathematics (STEM). However, to date, there remains a limited glossary of BSL terms for mathematics.

This project aims to fill this gap and is being led by Dr Ken O'Neill. The aim is to expand the Glossary of signs and terms for mathematics through a collaboration between the SSC (Rachel O'Neill and Dr Audrey Cameron), deaf sign linguist (Gary Quinn, Assistant Professor at Heriot-Watt University), deaf scientist (Frankie McLean), three deaf mathematics teachers (Gerry Hughes notably was the first deaf mathematics teacher in Scotland, Catherine Birch and Malcolm Sinclair) and Professor Nigel Mottram, from the University of Strathclyde, who has been assisting the team in finding funding for this initiative.

The team has conducted a review of the eighty-one signs from the existing BSL Glossary, deciding whether to keep, remove, upload or modify these existing signs. Focus then turned to more than 200 mathematical and statistical terms collected from Scottish Qualifications Authority's (SQA) National 4 and 5 curriculum documents as well as their GCSE counterparts. This was undertaken over one weekend in late April 2015 with the team discussing how specific terms are usually signed. This process of reviewing existing sources (if available), proposing new signs that can show the concepts visually and debating appears well suited to BSL.

Through this process the team has created seventy-seven new signs which, along with the existing eighty-one signs, provided a foundation for the team to build on more easily in the future. Recently, teachers within the current team have already used several signs to their students, such as equation, expression and term, which are obviously crucial for teaching algebra. Their experience shows that their students found these new signs easy to understand and helped them to progress. As expected, the creation and development of these signs were not without issues. The most critical issue was to take care to ensure that each sign did not give away too much additional information during SQA and GCSE examinations. This restriction was problematic when creating some signs, where it must be ensured that the signs remain visually clear. The complete list of over 200 mathematical and statistical terms took a considerable time to develop.

More recently, an IMA Small Grant together with funding from the Edinburgh Mathematical Society and the London Mathematical Society has allowed this work to continue. The continuing work has enabled further analysis of more signs and concepts, during which these new terms were categorised and, after discussion, the signs and their definitions are filmed. The process of deciding on a BSL definition can be lengthy since the team attempt to work from their own understanding and usage of mathematics and statistics rather than from a written English textbook; if the person signing the definition relies too much on the structure of written English the definition runs the risk of losing features of BSL, such as simultaneity, use of classifiers and metaphor in explanation.



Sign for factorising quadratic expressions.

To disseminate our work to IMA and beyond, we gave a paper at the IMA's International Conference on Barriers and Enablers to Learning Maths: Enhancing Learning and Teaching for All Learners in June 2015 and at the International Congress of Education of the Deaf in Greece in July 2015.

Clearly, this is an ongoing, long-term project and both new additions and changes will be made to the BSL Glossary for Mathematics and Statistics. Further funding for these activities is currently being sought. Future parts of this project would consider terms relevant to the SQA's Higher and Advanced Higher Mathematics curriculum documents, taking care to ensure that terms in both GCSE and A-Level are included. Beyond Advanced Higher/A-Level, it will be problematic to continually expand the BSL Glossary due to the vast range of mathematics topics at undergraduate degree level. In order to tackle such a task additional people and support will be needed, and a new strategy will be necessary to implement this particular problem.

It is likely that there are few deaf students currently enrolled on Mathematics or Mathematics-related degrees simply because it is difficult to study these subjects without access to a full technical language at school or university. This project's main impact will therefore be in promoting use at schools, expanding access to higher education, and to assist future undergraduate students. It is expected that all current deaf students can benefit from this project although most of the benefits will be in the longer term as more deaf children have access to mathematics and associated concepts, and subsequently pursue further study in this subject area.

The BSL (Scotland) Bill recently made its way through the Scottish Parliament; it was unanimously backed by all MSPs and will become an Act once it receives Royal Assent – then, BSL may be more widely adopted by individuals and not just deaf people but all those who communicate with deaf people in whatever situation or capacity. It may then become easier to improve access to mathematics and statistics for children if BSL is offered as a language option in a similar way to Gaelic, which has become a language option in Scotland. There is of course then an acute need to build up a glossary of signs if this is to be a reality. The resources of the Deaf Community, drawn into the SSC Glossary Project, could then be used by a much wider group of children, hopefully including more mathematicians and mathematically literate citizens.

Ken O'Neill MIMA
Scottish Government

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