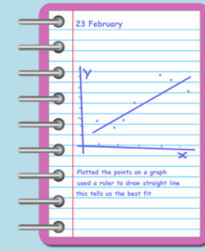


Journal/Portfolio Writing, Displays, Learners' Powerpoints



By Mike Ollerton

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INTRODUCTION

Journal writing in order to help learners to write about the mathematics they have been working on, to explain the problems they have solved and the sense they have made of the mathematics they have been learning; to explain their mathematical journeys.

The issue of encouraging learners to write about mathematics is by no means a recent phenomena as the following quotes illustrate:

As soon as a child shows real understanding of his (sic) counting, he should learn how to record it. "Writing down what you have found out" is the first piece of 'written arithmetic' Gagg [1959:117]¹

Writing about mathematics is not generally developed. There is a lot of 'written work' connected with 'exercises' but there is little communication of mathematical ideas in writing. An explanation of a result, a description of methods used in solving a problem or carrying out an investigation, an interpretation of a graph, or a written mathematical topic arising from an in-depth study, are among the written tasks which could feature in mathematics. DES [1985:13]²

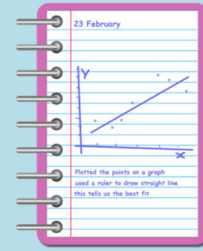
One of the most pointless and time-consuming tasks I ever experienced as a mathematics teacher was taking home armfuls of exercise books on which I would make ticks and crosses possibly adding the briefest of comments. All the time I was doing this I knew it neither benefitted those I was responsible for teaching nor myself as their teacher. I knew my comments would rarely be read or acted upon and, in part, this was probably because my comments were neither worth reading nor acting upon!

In September 1986 (my second year as a HoD) I had the good fortune to be guided towards a new GCSE syllabus (by Razz Lamplugh then a Shropshire Mathematics advisor). This syllabus written by a group of members of the Association of Teachers of Mathematics (ATM) and certificated by the Southern examining Group (SEG). This syllabus was based upon a 100% teacher assessed coursework model. This GCSE scheme appears in more detail in Mathematics Teaching 203 and can be accessed at: http://www.mikeollerton.com/pubs/atm_pubs/ATM-MT203%20ATM-SEG%20GCSE.pdf

¹ Gagg, J. C., (1959) Beginning the three R's, Evans Brothers Limited, London.

² DES (1985) Mathematics from 5 to 16: Curriculum Matters 3, HMSO.

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In order to collect 'evidence' of learners' achievements, matched against specific criteria such as: Communication, Implementation, Interpretation, Content Knowledge, Mathematical Attitude... and learners were encouraged/expected to write about the work they had done and the problems they had solved.

Over time each learner produced a portfolio of evidence. So during the course of their KS4 they would write-up in the region of fifteen or so pieces of work. These write-ups were based upon major topic areas upon which our mathematics department scheme of work was constructed; for example Trigonometry, Transformations & matrices, Volume & surface area, Angle & circle theorems, Sequences, functions & graphs etc.

As we realised the power of expecting learners to reflect upon and write about the mathematics they were/had been working on we began using the same approach in KS3. Whilst some time was given over to writing-up in lessons, homework was also used for the same purpose.

An interesting outcome was how accurately we were able to look through portfolios of work and accurately moderate/assess the work produced against NC criteria at KS3 or GCSE criteria at KS4.

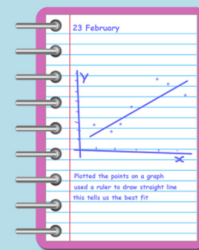
Other advantages of portfolio/journal writing for learners were to:

- become naturally reflective about their learning;
- develop communication skills, thus forging a natural link with literacy;
- receive formative feedback during the production of their writing-up;
- demonstrate understanding and achievements both in terms of mathematical content knowledge and mathematical thinking skill development;
- become explicit about their implicit knowledge;
- weave into their writing illustrations, example, graphs, tables of results;
- gain a sense of their achievements in terms of how far they had been able to go with a topic/unit of work.

For the teachers the advantages were:

- not needing to take home, to 'mark' learners exercise books because these served the purpose of rough notebooks, thus we used 'marking' time to provide more meaningful comments;
- to find tasks which were essentially problem-solving by nature and developmental so we could see progression both as it happened in classrooms and in learners writing;
- to gain strong sense we were doing a good job.

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Given I am no longer in the classroom with my 'own' learners, I can only offer encouragement to teachers of mathematics to consider journal writing; to start in Y7 lesson 1, or in primary schools at as early an age as is felt feasible and appropriate. I would use capitation to purchase A4 size plain paper, attractively bound journals. The idea of having plain paper is so learners can decide where and when to add an illustration, perhaps the quadrilaterals they have previously explored and drawn on 9-dot (square) grid paper, or a graph or some brightly coloured paper they had folded in order to make fractional amounts. Within the parameters of demonstrating their mathematical thinking I would be clear that what learners decide to write in their journals is of their choice; explaining how they went about making sense of what we/they had been working on and the problem(s) they have been solving.

For example, writing about and drawing diagrams to explain and illustrate what multiplication means is possibly more valuable than 'just' carrying out lots of multiplication sums. Secondly, writing about how to carry out a multiplication calculation, by describing the actual process, is aimed at deepening learners understanding of multiplication. So, instead of asking a student to 'do', lots of multiplication sums, they will enhance their knowledge by doing fewer sums and using the 'saved' time to do some writing. This principle can be applied to any mathematical concept. To aide this process the teacher could help learners to create a writing frame, perhaps by asking learners to recall the main events arising a single lesson or from lessons over the course of the past one or two weeks.

Mathematical vocabulary

Helping student understand mathematical vocabulary is a key feature of learning mathematics. Listing the vocabulary that has been used in a lesson/over a sequence of lessons, as it occurs, is an integral part of learning to make sense of mathematics. Learners similarly can then be encouraged to use pertinent vocabulary during subsequent lessons. A useful task, either for homework in preparation for the next lesson or during the final few minutes of a lesson, can be for learners to write what they think the definitions are of vocabulary which has 'appeared' during a lesson. Some teachers may prefer learners to create their own mathematical dictionaries into which they add 'new' words as they emerge; prior to writing their definitions there can be useful opportunities for whole class discussion to try to avoid learners writing an incorrect definition.

Display work

Whilst enquiry-based learning lends itself to the production of display work, it is also perfectly feasible to create display work from any mathematics lesson, even the most directed/specific skill-based, consolidation type of lesson. For example, learners could be asked to make a poster or produce a PowerPoint to explain how they have carried out a particular calculation, whether it is long multiplication, rounding off a result to 2 decimal places or writing a result in standard form.

One issue I would need to consider would be about learners taking home their journals to carry on their writing. Given the difficulties some children have about bringing a pencil, a ruler etc to their mathematics lessons, I would not want their journals to be mislaid/lost; of course no system is 'perfect'.