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Micro Math

Reviews

Dynamic Geometry

Reviewers: **Julie-Ann Edwards and Keith Jones**

Dynamic Geometry
Edited by Ronnie Goldstein, Hilary Povey and Peter Winbourne
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With the current and continuing attention on the teaching of number, it is refreshing to welcome this useful publication on geometry from NCET. Its aim is to provide "ideas, suggestions and approaches" to using dynamic geometry software in secondary mathematics based on the experiences of eight teachers from four very different schools who had access to such software over a term or so. In its twenty pages there are a wealth of ideas and practical suggestions. The booklet is visually stimulating (although the cover is a little stark) and well produced. It comprises five main sections: Getting Started, Construction, Polygons, Locus, and Angle, supported by an introduction and conclusion. Within each section there are illustrations, examples of suitable tasks and descriptions of classroom experience. The strength of these examples lies in the fact that they come from across the age range from year 7 to year 10, from both mixed ability and setted groups, and from work at computers in the computer room and within the mathematics classroom.

Particular strengths of the booklet include the advice on getting started and how this needs time, the crucial difference between drawing and construction, and the encouragement to link work at the computer to other classroom activity. Much of this is supported by examples of tasks which are ready for use. For example, the Getting Started section highlights the difficulty in ensuring learners become familiar with the software while, at the same time, active learning of mathematics is taking place. There are clearly no easy answers here, but the broad range of experiences documented in the booklet is helpful. The Construction section describes some of the mathematics learning possible using dynamic geometry software. Of all the sections, it demonstrates most fully the software/mathematics mixture of learning that occurs with such software. The ideas of dependency and invariance are discussed with reference to the dragging facility in the software. Again, the issue of the amount of time required to grasp these ideas is emphasised. Further sections

continue this style of combining examples of classroom tasks with accounts of the classroom from the teachers. All this underlines the usefulness of this booklet.

Inevitably there are a few limitations and omissions. The style is a bit odd at times, shifting from the impersonal to using "we" without warning. The locus section, for example, stands out as containing no classroom accounts and, as such, sits rather uncomfortably with the other sections. Then there is the issue of the different forms of the software. The introduction states that the booklet "has *not* been written to compare the three different applications" currently available, yet some of the differences have to be dealt with later on in the booklet (for instance, when giving an example of a sequence of tasks, and when mentioning menu items). This illustrates that the statement "the important matter here is whether and when to use dynamic geometry software", and not which particular package to use, may be something of an oversimplification. There are clearly features of each package which are important in deciding whether and when to use such software. A list of strengths and weaknesses for each piece of software would have been helpful (or, alternatively, reference to reviews of each) together with advice on which software is most suitable for each of the example tasks. In fact, is list of references to articles in MicroMath and elsewhere which give other accounts of using dynamic geometry software would have been valuable.

Some sections are more helpful than others. For instance, while the Getting Started section is certainly very useful, it is the only section that does not include examples of actual tasks that can be used with pupils. In later sections, understanding the difference between drawing and construction is highlighted as a crucial issue for learners. Yet it is unclear what the learners understood by this emphasis on construction. Was it an imperative specified by the teacher? Or something you have to do in mathematics when using a dynamic geometry package? The influence of the software is perhaps underplayed too. Constructions have to be done in a particular way and this is specific to the software. Linking work with the computer to other work is mentioned but there is no room for any examples. Perhaps this could be the topic of a second booklet.

Throughout the booklet there is little reference to the National Curriculum. Of course, this might well be an attractive feature to some, but to many teachers it will detract from the immediate usefulness of the publication. For example, the opportunity has been missed to underline how using dynamic geometry software can provide pupils with the opportunity to "use computers to generate and transform graphic images and to solve problems" (a requirement of the key stage 3 and 4 programme of study for Shape, Space and Measures).

A more fundamental issue, however, is the way that notions of proof are handled in the booklet. While it is possible that such ideas were not encountered during the classroom episodes on which this booklet is based, this does not seem to have prevented a section on locii. This makes the lack of a fuller consideration of proof even more puzzling. In fact, the explicit encouragement, in the introduction, to use measuring to verify observations seems oddly at variance with later sections which do provide suggestions for moving beyond "pattern spotting". The tone of the conclusion seems to suggest that it is both difficult to design tasks that involve ideas of proof and, in any case, formal proofs will not be the result.

Overall, the aim of providing ideas is certainly met, and the answer to the question posed in the introduction "whether every secondary school ought to have access" seems to be yes. There is certainly much encouragement here and a good deal of practical advice. The team of teachers involved are to be congratulated on producing such a range of ideas in such a limited time. While there is more to be done, there is much in the booklet that everyone will find useful and stimulating. Every department should definitely have access to it.

Julie-Ann Edwards works at Regents Park School, Southampton
Keith Jones works at the University of Southampton