

## CLASSROOM IMPLICATIONS OF RESEARCH ON DYNAMIC GEOMETRY SOFTWARE

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Published research on the use of Dynamic Geometry Software (DGS) can be categorised under three main headings (for more details, including an annotated bibliography of the relevant research, see Jones 2002a; 2002b):

*Interacting with the software:* A number of studies have looked in depth at how students interact with the software. This research shows, for example, that at first students see dragging as something that distracts and interferes, since they are not used to seeing geometrical objects moving on paper. Once they start experimenting they begin to understand the power of the drag mode. Knowing what is invariant when a drawing is dragged is not always obvious.

*Designing teaching activities:* Research on the use of DGS has highlighted how diagrams play an ambiguous role in geometry. Thus teaching activities have to be carefully designed, otherwise students may avoid mathematical analysis by looking for the practical implementation of a solution and not towards its theoretical aspects and implications. Research shows that designing teaching scenarios based on DGS and integrating them in the regular course of classroom teaching takes a long time.

*Learning to prove:* This area of research focuses on the vital question of whether the opportunities offered by DGS environments to ‘see’ mathematical properties so easily might reduce or even replace any need for proof or, on the contrary, whether such a facility might open up new ways of meaningful approaches to promoting students’ understanding of the need for and the roles of proof. A range of research has examined this issue and demonstrated that judicious use of DGS can foster an understanding of proof.

Overall, research has found DGS cannot provide a self-contained environment, but that other activities are need for students to make progress in mathematics. What matters is *how* dynamic geometry software is used. Used inappropriately it may make no significant difference to pupils learning (and could make things worse); when used for conceptual exploration it can lead to conceptual gain and facilitate some types of learning activities (for example, exploration and visualisation) and enhance some others (such as proof and proving).

### References

Jones, K (2002a), Research on the Use of Dynamic Geometry Software: implications for the classroom, *MicroMath*, **18**(3), 18-20.

Jones, K (2002b), Research Bibliography: Dynamic Geometry Software, *MicroMath*, **18**(3), 44-45.