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3-Dimensional Dynamic Geometry

The space is an essential media of man. Therefore it is an ongoing task to make space referencable by geometric representation and modelling for its rational exploration and application. Now computer representations using all the possibilities of computer graphics for synthetic geometry of space do exist besides its traditional representations. The dynamic 3D-geometry or the drag-mode-geometry in space plays a further-reaching role among synthetic geometry in the virtual space than the geometry of the 2-dimensional dynamic geometry systems: geometric constructions in space e. g. such of Euclid (cf. Book XI-XIII) are now executable, which in the past have been confined to an execution in imagination and had to be represented by the methods of descriptive geometry in the plane. The prototypic Cabri 3D (Laborde, Bainville 2004) overcomes this limitation and supports in general the synthetic geometric work (generating, visualizing, manipulating, modifying of spatial configurations) by direct manipulation in the virtual space thanks to its software ergonomic facilities and its geometric options.

The following traditional topics for synthetic spatial geometry have to learn a new adequate treatment resp. a re-evaluation in the context of the teaching and learning of synthetic spatial geometry by the use of this cognitive computer tool:

- the geometry of solids, particularly the geometry of the polyhedra (including the platonics and their derivatives)
- the positional relationship of geometric objects (e.g. of points, lines and planes)
- the spatial construction tasks (e.g. with "plane ruler" and "sphere compass" and/or with spatial congruent transformations)
- the creation of spatial analogies from methods, concepts, theorems and proofs of plane geometry (e. g. the geometry of the triangle to the geometry of the tetrahedron)
- the spatial treatment of the conics (e. g. corresponding to their denotion)
- spherical geometry
- descriptive geometry (e. g. the knowledge of projections is still necessary for a deeper understanding of the virtual space)
- the applied modelling with the tools of synthetic geometry.

References

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