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**Concrete models and dynamic instruments as early technology tools in classrooms at the dawn of ICMI: From Felix Klein to present applications in mathematics classrooms in different parts of the world.**

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Summary: Most national curricula for both primary and secondary grades encourage the active involvement of learners through the manipulation of materials (either concrete models or dynamic instruments). This trend is rooted in the emphasis given, at the dawn of ICMI, to what might be called an experimental approach: the links between mathematics, natural sciences and technology were in the foreground in the early documents of ICMI and also in the papers of its first president, Felix Klein. However, the presence of this perspective in teaching practice is uneven. In this paper, we shall reconstruct first an outline of what happened in three different parts of the world (Europe, USA and Japan) under the direct influence of Klein. Then, we shall report classroom activities realized in the same regions in three different research centres: the Laboratory of Mathematical Machines at the University of Modena and Reggio Emilia, Italy (<http://www.mmlab.unimore.it>); the pedagogical space of Kinematical Model for Design Digital Library at Cornell, USA (<http://kmoddl.library.cornell.edu/>); and the Centre for Research on International Cooperation in Educational Development at Tsukuba University, Japan (<http://math-info.criced.tsukuba.ac.jp/>). They have maintained the reference to concrete materials (either models or instruments), with original interpretations that take advantage of the different cultural conditions. Although in all cases the reference to history is deep and systematic, the synergy with mathematical modelling and with information and communication technologies has been exploited, not to substitute but to complement the advantages of the direct manipulations.

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