Programming as an Everyday Tool in Mathematical Education

ETH

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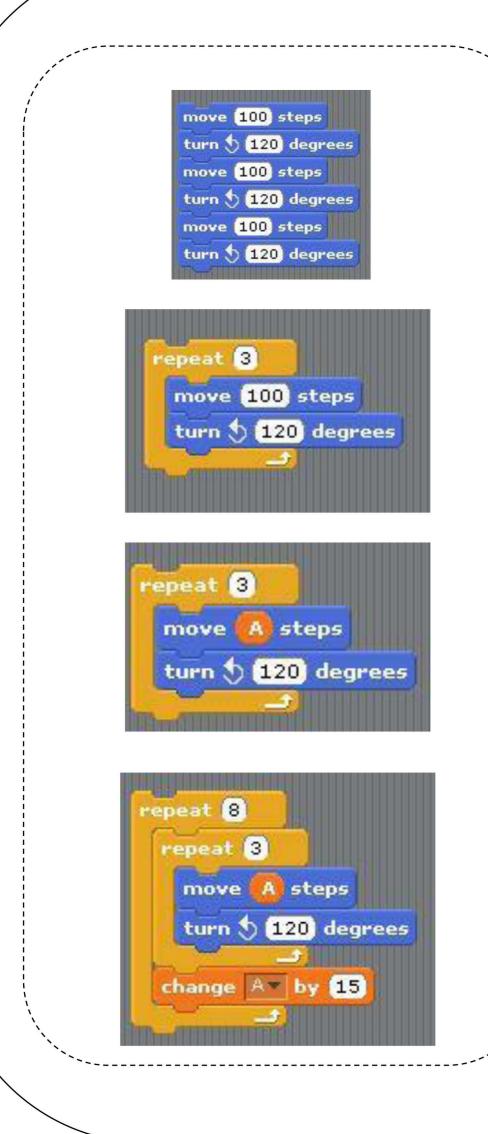
Klaus-Tycho Förster
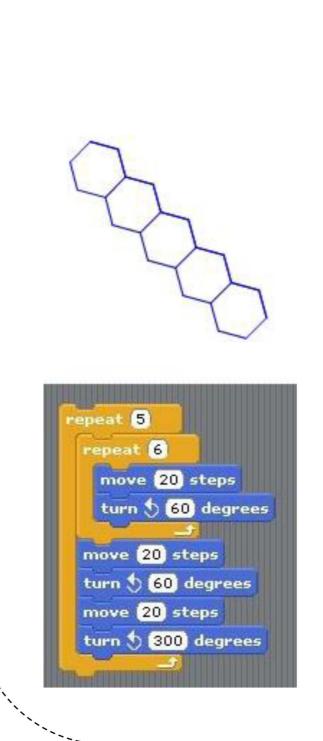foklaus@ethz.ch

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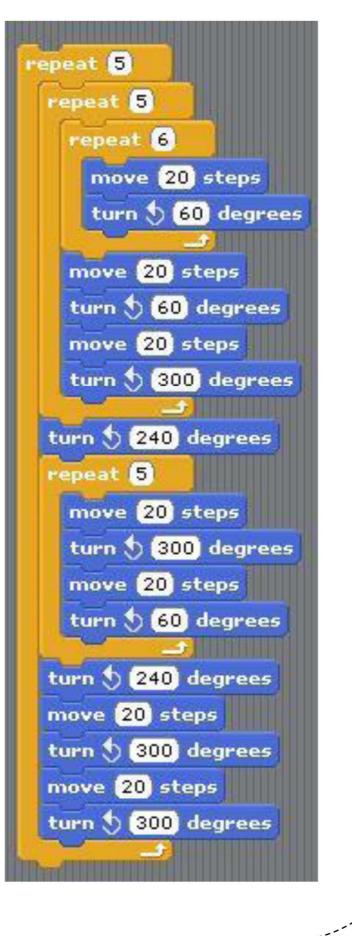## Programming, Geometry, and Mathematics

- *"Programs are more <u>discussable</u> than traditional mathematical activities: one can talk about their structure, one can talk about their development, their relation to one another, and to the original problem"* [1]

- Tasking a student to write a program can be compared to giving a constructive proof [2]

- Describing a geometrical construction is nothing less than giving an appropriate algorithm for it [3]

- The final form of the description of a geometric construction is the algorithm, which then can be translated to a computer language [4]
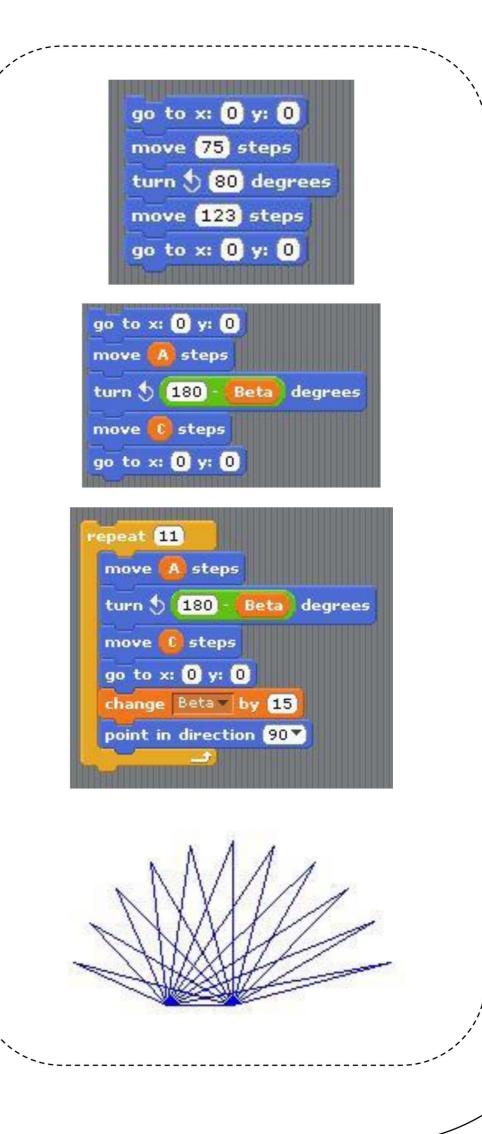
variables
constructive proof modularization
telling the machine how to do it
geometric construction exactness
problem solving rigorous thinking algorithms
functions

Polygons, Tessellations, Congruent Triangle Constructions – with Scratch

We see programming as an essential technique that should be treated just like any other mathematical tool

To be used when appropriate, not to be applied when other tools are more useful, and not taught for it's own sake

References:
[1] W. Feurzeig, S. Papert, M. Bloom, R. Grant, and C. Solomon. *Programming-languages as a conceptual framework for teaching mathematics*. SIGCUE Outlook, 4(2):13–17, Apr. 1970.
[2] K. M. Strecker. *Informatics for all - how much programming is necessary?*. PhD thesis, University of Göttingen, 2009.
[3] G. Holland. On the Relevance of Construction Exercises in the Geometry *Der Mathematikunterricht*, 20(1):71–86, 1974.
[4] B. Schmidt-Thieme. *Explaining as a Competence in an Interdisciplinary Perspective*. In Beiträge zum Mathematikunterricht, Hildesheim, 2009. Franzbecker.