

Geometric Constructions

An Experiment on Blended Learning





- Developing a geometry course for the Center for the Development of the Gifted and Talented (CDGT) at HKUST in 2013
- A course for gifted secondary school students about "geometric constructions" – drawing geometric figures using compass and ruler
- Use computer software to simulate compass and ruler
- Students need to do constructions through computer in class
- The course was well-received by students

Dynamic Geometry Software

- C.a.R. (Compass and Ruler) is a nice dynamic geometry program developed by Rene Grothmann
 - A Java program (cross-platform)
 - Open source (free)
 - Very easy to produce online "assignments" of geometric constructions for students
- Geogebra is a more well-known dynamic geometry program developed by Markus Hohenwarter
 - Available on all platforms (including ios and andriod)
 - Open source (free)
 - Very active development

+ Blended Learning

- Blended Learning Initiative a pilot program at HKUST to encourage faculty to experiment with new pedagogical approaches that blend online and face-to-face delivery
- "Geometric constructions" is a very suitable topic for us to try out this blended learning approach
- Beefing up the content of the course that we taught to gifted secondary students to make it an undergraduate course

+ A Geometry Course

- In Spring Semester of this year, we offered the course "MATH 2741 Geometric Constructions"
- Students need to study online materials and do interactive exercises weekly
- Meet with students once a week in computer lab to discuss deeper and harder problems related to the weekly online materials
- Teaching assistant provides face-to-face support for students during tutorial class every week





- Learning Management and Evaluation System (LMES)
- Developed by HKUST from an open source framework
- Functionalities similar to Moodle (a more well-known open source e-learning system)
- All online materials of MATH 2741 are put on LMES
- Let's see some examples of the online materials...



- Students found the interactive exercises interesting
- LMES cannot record students' activities on most of the interactive exercises
- Cannot view the online materials on mobile devices because Java cannot be run properly there
- A way to improve replacing all construction exercises generated by C.a.R. by Geogebra html5 applets



- The latest version of WeBWork supports Geogebra html5 applets
- A possible way to assess students' activities on interactive exercises – putting the exercises on WeBWork!
- Use WeBWorK Applet interface to interact with Geogebra



Thank you !

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