Michiel Doorman and Carolien Duijzer, ***The teaching and learning of dynamic data modeling***

In this presentation we focus on instructional activities that aim at supporting students in their learning of the basic principles related to dynamic data modeling. The activities are supposed to ensure that mathematical concepts will be rooted in students' everyday-life intuitions, experiences and perceptions. In two studies we created activities for grade five and grade ten students. Classroom events and computer activities in grade ten were video-taped, group work was audio-taped and student materials were collected. Qualitative analyses of these data showed that the basic principles of calculus can be developed from students' modeling motion when they are supported by discrete graphs. In the second study sensor-supported activities for grade five are tried out with small groups of students in an out-of-school setting. Initial findings suggest that embodied experiences can be an important lever for further learning. In this session we present results of both studies and we will discuss what the basic concepts are that underlie the teaching and learning of dynamic data modeling.

Nadine Benstein, ***Discrete Mathematics for the Fostering of Mathematically Talented Children***

In the project "MIKADU" at the Bergische Universität Wuppertal, tasks of discrete mathematics were tested concerning their potential for the sake of fostering mathematically interested and talented children. These tasks include the optimization of parking lots (cf. Verhulst & Walcher 2010), and the finding of circular and shortest paths in simple contexts. The solutions and especially the procedures of the children will be presented, and the task will be analyzed regarding their potential for revealing and fostering the children's giftedness in mathematics. On the one hand, mathematical giftedness is defined on the basis of particular features (cf. Käpnick 1998) that might be fostered or revealed by specific tasks. It will be discussed in how far the aforementioned task examples of discrete mathematics serve this cause. On the other hand, the applicability of different problem solving strategies, attributed to mathematical giftedness (cf. Fuchs 2013), will be dealt with.

Literature:

Fuchs, Mandy (2013). "Vorgehensweisen mathematisch potenziell begabter Dritt- und Viertklässler beim Probelmlösen: Empirische Untersuchungen zur Typisierung spezifischer Problemlösestile". In: *mathematica didactica* 36. 97-125.

Käpnick, Friedhelm (1998). *Mathematisch begabte Kinder: Modelle, empirische Studien und Förderungsprojekte für das Grundschulalter*. In: Pehnke, Andres (Ed.): *Greifswalder Studien zur Erziehungswissenschaft, Volume 5*. Frankfurt am Main: Lang.

Verhulst, Ferdinand & Walcher, Sebastian (2010). *Das Zebra-Buch zur Geometrie*. Heidelberg: Springer.

Fabrice Eudes, ***Lines, points and pixels***

Droites, points et pixels

Un trait rectiligne, tracé sans lever le crayon (ou la trace du pli obtenu en pliant puis dépliant une feuille de papier), est un objet élémentaire que l'on peut naïvement qualifier de continu. Des élèves interrogés sur le nombre de points se trouvant sur ce trait, nommé droite, répondent assez rapidement « autant qu'on veut » ou « une infinité ». C'est une première discrétisation que de regarder une droite comme un ensemble de points. Aujourd'hui, nous vivons cerné d'écrans : téléviseur, moniteur, téléphone, montre, etc. Ces écrans nous présentent quantités d'informations, parmi lesquelles de nombreux segments ou droits. Une image affichée sur un de ces écrans est composée de points élémentaires appelés pixels. Ils sont en quantité finie. Comment savoir lesquels choisir pour tracer une (approximation de) segment? Par ailleurs, cet affichage est automatisé; une machine le gère pour nous. Comment décrire efficacement nos choix à la machine pour qu'elle soit capable de produire l'affichage voulu?

Lines, points and pixels

A straight line, drawn without lifting the pencil (or the line obtained by folding, then unfolding a sheet of paper) is an elementary object which one can considered as being continuous. If we ask pupils how many points one may count on this (mathematical) line, they will eventually answer “as many as you want” or “an infinity”. Looking at a line as a collection of points is starting a discretization. Nowadays, screens are all around us: TV, monitors, mobile phones, watches, etc. These screens display lots of informations, amongst which many segments or lines. A picture displayed on these screens consists of elementary points called pixels, from “picture element”. They are in finite number (their size can vary but can't be arbitrary small and the surface of the picture is finite). How do we identify the pixels corresponding to the line we want to display? Besides, an electronic device chooses these pixels for us. How has it been set up?

Gerd Hautekiet, *Let’s apply mathematics to computer science: searching and sorting*

Mathematics has applications in sciences, economics… but also in computer science. This is the case with different branches of discrete mathematics: graph theory, logic, complexity theory of algorithms... This workshop is about algorithms for searching and sorting in a set of data. The algorithms are intended for computers treating large amounts of data, but in the workshop playing cards will be the data and … *you* will be the computer! You will learn some popular searching and sorting algorithms and we will discuss the theoretical time required for the execution of these algorithms.

Christine Docq, Laure Ninove and Rosane Tossut, *Rosaces and polygon wreath.*

From the observation of several *rosaces*, you will be invited to define this concept.
You will discover some construction techniques of rosaces with Apprenti-Géomètre software.
Then, you will play with isometrical regular polygons and try to construct and study what we shall call *polygon wreaths*.