DynaMAT Intermediate Management Meeting

Reykjavik, September 2 – September 6, 2011

Friday, September 2, 2011

Arrival all teams.

Present: Andreas Ulovec (University of Vienna, taking the minutes), Soňa Čeretková (University of Nitra), Neli Dimitrova (Bulgarian Academy of Science, Sofia), Vladimir Georgiev (University of Pisa), John Andersen (VIA College, Arhus). Freyja Hreinsdóttir (University of Iceland)

Saturday, September 3, 2011, 09:30 – 11:15

Freyja: Welcome to everybody.

Vladimir: (Going through the program)

John: Next semester I will have the opportunity to try out and use the materials in my course. Since the Vienna meeting I have written two more pieces: Arithmetical mean, and dynamical simulation of stochastic phenomena with Excel.

Presentation of DK team

Discussion of DK materials:

The Tall Tree:

Freyja: I think this is very nice, and you can do it with a lot of different settings. Vladimir: Here you use GPS, **maybe we can also have some historical remarks**, e.g. we can use the compass and do it with this. One more thing, from mathematical point of view, this we can call inverse problem. You have problem, then finding out possible ways of finding solution indirectly, then checking out solution.

John: I think the historical remarks would be good.

Andreas: I like it very much, because it is **real application**, not only lines on paper. Sona: I also like it and will try it out with my students. I will send article for references.

GPS – geometry in the landscape:

Neli: So this is **linear approximation**, which is very nice. How many points did you use?

John: This was more a matter of it being practical.

Vladimir: Apart from the pdf file, do you have some **other software** things that you can link from the pdf file?

John: I have not done it yet, but of course I will do it and put in the links. Also there are links to videos.

Vladimir: I was thinking for some **applications in the gardens**. Are the errors small enough for that?

John: I don't think so, it is not exact enough.

Dynamical simulation of stochastic phenomenon using Excel:

Andreas: Very interesting **combination of stochastic and Excel**, not only usual things like tables and graphs of normal distribution.

Saturday, September 3, 2011, 09:30 – 11:15

Arithmetic means:

Vladimir: One thing about this, I found that now we speak about students in school, but if you look at **university students**, they **have big problems to understand probability**. So I think it is **necessary to have these units in school**, because afterwards they often have very abstract explanations and don't know what it is. Sona: There is journal *Spreadsheets in Education*, where you may be able to publish something of it. Would be a good dissemination. I will send you links.

Presentation of BG team

Discussion of BG materials:

Can equations be exciting:

Sona: I am thinking about students, whether we are able to find students who understand the underlying mathematics. I can definitely offer the article to colleagues at the university. About Maple, is it free?

Neli: In my university it is, but it can be done in any System.

Freyja: Also **for learning programming**, this can be easily done, because it is not complicated programming.

Vladimir: I really like the fact that the **mathematical level is high here**. So maybe the group of students is limited, but still good. Maybe some of the definitions may be combined with explaining pictures.

Neli: Also **some students found the pictures very good**, as they see that solution of equation can be so beautiful.

John: I agree with this, you **can get students attracted to the pictures**, and students may want to find out how it is done.

Creating dynamic geometry constructions as composition tools in art and photography:

John: When you showed how to use the tools it was very visual, which is very easy to follow for students.

Sona: I like the idea very much.

Andreas: I also like it, particularly applying GeoGebra in it, **not only for standard problem on white surface**.

Vladimir: Turning back to the target group, I think **this can be used for primary and secondary**, because **you can also ask mathematical questions**, so it is **not only nice picture**, but has mathematical background.

Sona: I think is it also very good from the point of view on how to make a good photograph.

When you simply decide to dream / the story of a project:

Freyja: Are there tasks?

Neli: No, but there are a lot of problems that we can send you.

Vladimir: So this is **new experience, we not have teaching materials** or units, **but have something coming from the students about what they did**.

Sona: It should be also some output of our project, to **show some students' outputs that are inspired by materials**.

Andreas: I **like the idea of having student papers**, also I like the idea of having something different, because there are also students already fascinated who want to do pure mathematics.

IMO problem:

Vladimir: Do not use the word "veteran";-)

Sona: It is great that she was able to share this. Because I know several teachers who do not want to share their materials.

Neli: Also Oleg wants to try out other geometrical figures with this.

John: It also shows that you can **start with very simple things and can obtain deep results**.

Saturday, September 3, 2011, 14:30 – 16:05

Presentation of SK team

Discussion of SK materials:

Percentage in Graphics:

Sona: I will **ask him to write some conclusion, or how to apply it in schools**, or prepare handouts and remarks for teachers. Also how about the length of the articles? Vladimir: Are there **some tasks included**?

Sona: Yes, that should be done.

John: I like the idea of doing it geometrically. Would it be possible to see the base in the graphics?

Why will we pay double sum of money:

Sona: Where is dynamical?

Andreas: Yes, that would be my question too. **This is pretty standard approach**. John: Maybe they can **build the calculator in Excel?**

Sona: Also include what happens in reality, fees, insurance etc.

Freyja: Also inflation etc.

Andreas: Also the conclusion is not conclusion, but remark.

Reproduction of antique elements:

Andreas: **Maybe put the vase as background picture**, then you can see how good the construction is. But the **material is pretty good**.

Neli: Also some hints could be given, because it is pretty complicated.

Geometrical construction with graphic assignment

Sona: So there is **no conclusion, only tasks. Is it dynamical enough?**

John: The **constructions can be dynamical**, so we can add analysis of conditions and parameters.

Sona: Also not solved tasks should be added.

Andreas: I like the **idea of working backwards**. That is a good example for it. Neli: Or change conditions, ask "is it possible to obtain a square with this construction?"

Vladimir: I think it is good to have the **different ideas**, so **we should not dismiss the articles**.

Sona: No, that was not the intention, but to get feedback to improve them.

How can a chemical reaction change ...:

Neli: So, the input is the chemical reaction. Vladimir: Very nice, also **using matrix**. Shall they use matrix before? Sona: I think it should, otherwise it is only klick-and-solve. Neli: We can also introduce matrix denomination by this, because it **shows good application of matrix**.

Regular polygons as car wheels:

Neli: This seems **very similar to the work of Jenny and Toni**. Andreas: You can also **make it more complicated by adding more details**. Sona: Or think about your own.

GPS mathematics in nature:

Sona: I recommended them your articles.

Saturday, September 3, 2011, 16:30 – 17:15

Didactic game:

Sona: The end of the article is some kind of pedagogical research and evaluation, also with statements of children and teachers.

Vladimir: The **author of this article invented the game then created the tasks, the tasks then ordered according to difficulty**. Maybe they should **put some tasks without answers**. Also there are some people who can do this (logical or combinatorial problems) very easily, others not. So it is **good to put such materials in**. Maybe **students can also be asked to invent new tasks or new games**.

Best spot:

Sona: There is no picture of the bridge.

Freyja: There **should be pictures from several positions**, so that **one can see the different viewpoints**.

Vladimir: **In high schools lot of things are known about lines, squares etc., but not so much about conic sections. So this is very good to have concrete problems**. Freyja: Also you **can do this in many places**, you do not have to go to Bratislava for it.

How to add infinitely long sums:

Vladimir: Very good. Neli: It is also connected to attractors. Andreas: Very good to **use lots of different representation**.

Geometry on the playground:

Andreas: The **tasks need checking as to whether all data is there** or can be obtained from the picture.

Neli: It also needs some English check.

Vladimir: This is also a lot about problem posing. I want to apply this in Pisa, two groups where one is posing and the other one is solving the task.

Sunday, September 4, 2011, 09:30 - 11:00

Presentation of IS team

Discussion of IS materials:

Making smooth splicing functions:

Freyja: This is so that **students can understand continuity and smoothness**. Vladimir: **Maybe the reverse problem can also be developed**.

Euclidian Eggs:

Sona: This is great.

Vladimir: So you have given a certain structure and try to approximate it with **GeoGebra.** You can do something similar in Mathematica, changing slope than approximate.

Freyja: You can put a trace on a point and do it.

Neli: **Is it possible to make dynamic construction**, i.e. using sliders to change the `shape?

Freyja: Yes, you only need to connect one of the points with a slider.

Vladimir: In Pisa, we may want to find the barycenter and the equilibrium.

Sona: There is also software that tells you how long the egg has to boil, according to several parameters.

Functions and sliders:

Andreas: I think for those who want to do differentiation, you can ask students "ok now it lines up graphically, proof it algebraically, because maybe it only looks correct".

Vladimir: Also I think it is **important to combine the graphical and algebraic approach**.

Transformation:

Andreas: Very nice to have graphic interpretation of transformations in a dynamic way.

Vladimir: Some labels need to be corrected, but great idea.

Freyja: Of course this needs to be developed further and written up.

Diophantine equations:

Vladimir: So in this way you **produce a sequence. How is n defined?** Freyja: You **put it in the command**, here it is -4 to 4. Sometimes the **context is not so great** however. Also it **would be nice for the CAS to calculate the first solution**.

Presentation of AT team

Discussion of AT materials:

Aviation:

Better graphics required, otherwise very exciting

Extreme Values:

Sona: Maybe we can **add more triangles, e.g. isosceles, equilateral etc.** Andreas: Also link with Freyjas materials should be added. Neli: And we can **add extreme value calculation of parabola without derivatives**.

Fractals:

Neli: Can we have colour picture of Julia set.

Andreas: Will start with black-and-white, then Mandelbrot will be colour. Also there will be link to Nelis material, and most importantly, there will be Logo file. Vladimir: This is good, as java may be too complicated for students and also for teachers.

Andreas: Also will add "zoom in and find self similarity" tasks

GeoCaching:

Andreas: This will link to Johns work.

John: I think its **good that we have introduction into how GPS works**. Andreas: Will also **add link to John as to example for inexactness of GPS** (jogging in Danube river).

Lens:

Andreas: this will get parabolic lens, and more tasks.

Vladimir: Can we have tracing line, so to show that focus point in spherical lens is not ideal, then do the same in parabolic lens? Or more than one ray?

Andreas: **Yes to tracing**, maybe not more than one ray, as it is very complicated construction.

Sona: I also know about material of solar power plant in desert. Andreas: We can have link in "recommended reading".

Sunday, September 4, 2011, 13:15 – 14:20

Presentation of IT team

Discussion of IT materials:

Napoleon Problem:

Andreas: I think part of it is **written like journal paper**. I **liked the beginning and the historical background**. Maybe **students are overwhelmed with the Complex numbers**.

Neli: I think it is very natural to use Complex numbers in geometry.

Freyja: It **can** also **be used to introduce Complex numbers**, as an application. Sona: **In Slovakia, it is not in the current curriculum**.

John: We can take some of the GeoGebra investigations and put them earlier in the article, so that more students can follow, and put the Complex numbers later. And those who are interested can read on and see the proof.

Sona: Somewhere is the expression "right angle", is it necessary which angle is right.

International experience of math labs in Pisa:

Sona: Very dynamic and lot of different ideas.

Andreas: I like the idea of adding the dragonflies, to show that you can step up the difficulty and ask questions. Maybe in the Diophantine Flash software the two columns can be moved apart so as to not look like one expression.

Sunday, September 4, 2011, 14:40 - 16:30

Ellipse/Perimeter/Ponceles:

Vladimir: So there is **elementary proof, as well as wrong conjecture** of constant area of triangle, but constant length of perimeter.

Andreas: I like very much that **out of a simple situation you can arrive at very deep mathematics**. Also that you have **conic sections coming out of this**, because often it is only basic concepts about conic sections in schools. And it is good that **GeoGebra is used for making the conjectures**.

Vladimir: We have the GeoGebra at the beginning, then have the theoretical proofs.

Andreas: Materials in EN to be finished by end of October 2011, translations to be finished by end of January 2012. Each partner to translate one piece per other partner + one own piece. About 120 pages are available per partner, i.e. approx. 50-60 in EN, 60-70 in own language.

Vladimir: We now need to talk about some **budget** things. We said we want budget reports every couple of months but that did not quite work out. So I think about simplified approach, use homepage and put travel, accommodation, food (accommodation and food = subsistence costs) costs online in there. Also you can upload the copies of receipts and boarding passes. So each partner contact person shall get login to manage your own data.

Demonstration of administrative homepage

Freyja: Is the time in this meeting part of the time sheet?

Vladimir: Yes, and all the time you need for developing the materials.

Sona: I already created **contract**, but it is **in SK**, do I **need to translate it in EN**?

Andreas: No, only if local rules would demand that.

Sona: No, they don't.

Andreas: Then also Brussels does not need it.

Vladimir: It can be in any European language.

Vladimir: Also reminder that we need to send the materials and the minutes to Jarmila.

Sona: Greetings from Jarmila, she asks us to confirm the date of Sofia meeting.

Vladimir: Sofia meeting is confirmed December 7 (arrival) – December 11 (departure).

Monday, September 5, 2011, 09:25 - 10:45

Vladimir: We shall shift the discussion about name to the webpage discussion.

Vladimir: **About the e-books, how we do the links?** It seems that the links to some files do not work.

Freyja: Should we put all the files of one material in one folder and do local links only.

Vladimir: I think it is very good idea that makes it easier to later structure it.

Sona: Shall we organise it according to countries?

Vladimir: We shall have database and then can make any structure which we like.

Sona: So there **need to be keywords**.

Vladimir: Yes, that is a good idea, and then we can make database research.

Vladimir: Also who will do the preparation of the database?

Sona: Can we do it as a Baccalaureate work?

Andreas: Yes, but it needs to be maintained after the student is gone.

Sona: I can ask students.

Andreas: Please also use the style files if you have not done so.

Andreas: Next point would be for partners to report about possible courses.

Neli: Jenny will use some materials next week, and also at regular courses at the University. Also for summer school HSSI there were lectures.

Andreas: And we need feedback from the students, so please everybody collect feedback.

Vladimir: It is quite simple in Pisa, because I have official course, so this is possibility. Also in Tuscany there is problem posing lab, where I can work with teachers and students.

John: I plan to **use some of the materials to students and colleagues**. Perhaps I could also manage to **make a course for teams of students**.

Freyja: I may have a **course this spring, so this would be a GeoGebra possibility**, maybe I can try GPS. Also **in two weeks I have some workshop in north of Iceland**.

Sona: There are several dimensions, future teachers that will use materials during math problem solving and didactics of mathematics lessons. Also some of my colleagues will do this in geometry or calculus. There will also be a seminar on feedback of the materials. I am also thinking about PhD students that will be informed and promote the materials to them, also as a basis of research in math education. We are preparing courses for professional development for in-service teachers, they will be in 2012-2013. Also course about IT in math teaching. These courses are also supported by e-learning.

Andreas: I will have **IT** in teaching mathematics course in the fall term, also with external students who are already in-service teachers. In the spring term there will be course on teaching methods and lesson planning. Also the usual in-service teacher training day,

where I hope to give a presentation about the project, or at least have poster or stand with info materials.

Sona: Shall we have sort of diary or space where we can have dissemination activities recorded?

Vladimir: I shall agree, but we should not make it obligatory for everybody.

Sona: I shall send you some form and you can adapt it to your local situation.

Monday, September 5, 2011, 11:05 – 11:35

Vladimir: About the homepage, I have the answer from EACEA and sent to you some time ago. We had two questions: One, about the acronym, "the agency has not any rules, but it might be useful to change it" (citation from their answer). I do not see a legal essential danger, so it is up to us.

Andreas: We do not need to change acronym, but may use another term for homepage.

Sona: How about DynaMathMAT.eu ? Agreed.

Vladimir: How about web space?

Andreas: We currently have below 100 MB, that should not be an issue.

Vladimir: This is a **lot of work for the SK partner**, so we may need to make small modification of staff costs.

Neli: Please **send very soon information about your Sofia flights to me**, we need it for hotel reservation.

Vladimir: Final thing, for the **next meeting we have the evaluator come to Bulgaria**, not to forget to put her expenses in the homepage also.

Andreas: This will be in subcontract, so no problem and no need to put it in travel costs.

Vladimir: Thank you to Freyja for organising and the great dinner yesterday.

Summary of decisions:

- Partners will modify materials as to above-highlighted suggestions
- Deadline for materials in final form: end of October 2011
- Deadline for materials translations: end of January 2012
- Try to keep materials around 50-60 pages (EN) and 60-70 pages (local language)
- SK team: check about creating database for E-book
- Acronym DynaMAT will be kept, homepage name will be changed to dynamathmat.eu to avoid complications with Dynamat company
- Upload financial information and copies of evidence (tickets, boarding passes, receipts [if not on daily allowance base]), using credentials that Vladimir sent to contact person of each team
- Next meeting in Sofia, Bulgaria, December 7-11. Send flight (or arrival/departure) info to BG team ASAP!