

S-TEAM- INQUEST- NEWS No. 4

February 4th, 2009

S-TEAM: May 1 is the day!

A message from Geir



Getting prepared!

So far in this project Peter Gray on behalf of NTNU has done a marvellous job - with very communicative

newsletters, a lot of direct email-correspondence with all of you participating in S-TEAM, and not the least done a tremendous job writing the proposal in this very successful manner. You have probably also noticed that we have a very motivated and skilled administrative staff, Hilde Røysland and Per Inge Andresen. As the consortium leader, and therefore responsible for us delivering what we have promised, I am both humble, but with such a team also confident that we can say: **Yes we can!** This last Obama-paraphrasing reflects the very impressive competence and dedication demonstrated by the responses from all of you as partners in this big consortium.

Yesterday we had our first negotiating/information meeting with EC - where they mentioned several times that they were impressed by the quality of the proposal, which of course reflects the quality of the consortium as a whole. They stated also that this was the largest project ever funded by their unit in the EC, and that they would like to follow us closely throughout the project period. This last comment I would myself regard as a promise, and not as a threat!

In a "previous life" I have been a dog musher - racing long races (up to 1000km). Perhaps this project could be compared with such long dog-races. Just now we are soon about to enter the start line - I wonder if you can feel the excitement?

I really look forward to cooperating with all of you.

Geir Karlsen
Consortium leader

Getting on with it....

The Brussels meeting went well and DG research seem pleased with the proposal. The next steps will involve specifying in more detail how we are going to do the work (more details below) but the main message is that we can get started very soon. So Mayday is not a distress call, but confirmation that a start date of 1st May has been agreed with our project officers at DG Research, subject to further smooth progress. So the start up meeting will take place on 7 & 8 May, which seem to be the preferred dates from the emails received last week.

We know that some of you can't make these and therefore suggest an additional day on May 9th when it might be easier for those who can't make the Thursday and Friday.

Alternatively, if this is not possible for you, we will consult individually and arrange an additional meeting with any work package leaders who can't make the May meeting.

The reason for having it so soon is to avoid timetable slippage, which would be inevitable if we leave it until the autumn. Some project activities will need to be synchronised with school or university terms/semesters and this will be easier if everything is up and running by September. So we emphasise that it is very important that at least one team member from each partner can attend. We suggest a maximum of two persons but if there are exceptional reasons to have more, it is OK providing you can do it within the travel and subsistence budget, currently €900/250 per day, x 2.

Venue

We are currently in discussions about this and will email the details as soon as possible, if possible by Friday 6th Feb.

Costs

Meeting travel and accommodation costs will be payable by the project although there will be a short delay before funds are released from the EC. This will probably happen before the end of June. There is a slight problem over the eligibility of travel claims based on tickets purchased before 1st May. We will get a definitive answer on this from our legal and financial advisers within the next few days.

Format

The main purposes of the start up meeting are to:

- introduce ourselves to each other
- establish contacts between partners
- set up the work packages
- agree on terminology, procedures etc
- Resolve any outstanding issues

The meeting will include individual work-package meetings and plenty of social opportunities to get to know one another and exchange views.

Next stages

All partners will have to log in to NEF-database to register partner information on authorized representatives etc, and to check pre-registered data.

All institutions must also appoint a Legal Entity Appointed Representative (LEAR) . Partners who don't yet have a LEAR will be reminded specifically.

Log-in information for NEF and instructions will follow in an email directly to partners on Friday 6.

Deadline for partners' registering and checking of data will be discussed with Per Inge tomorrow - but you won't get many days to do it!

The last detail...

The current document occupying our attention is the technical annex to the Grant Agreement, codename STAN. This is a reworked version of the proposal with less persuasion and more detail. In particular, we need to specify staff effort against each deliverable. I will circulate a separate template for this purpose to each partner, showing what was in the proposal and what needs to be decided individually.

Some of you may see differences between what you suggested and what emerged as a deliverable. The essential requirement for the proposal was that we only included deliverables which were capable of being realised as documents or other artifacts, i.e. results of actions rather than the actions themselves.

Doris Jorde came up with the metaphor of the project having "...a lot of little flowers rather than one big plant". We have a flourishing and very diverse garden in S-TEAM and from an ecological point of view this is more desirable than a monoculture. Whilst it is fair to say that the lack of a big idea on our part was a worry at some stages of the process, now it appears to be a strength. The trick will be to arrange the flowers harmoniously...

A two-part drama, in 109 deliverables..

One of the issues raised at the Brussels meeting was how S-TEAM fits with the overall Science-in-Society and science education policies within FP7. The DG proposes a project review after 18 months, which is a natural break point within our milestones table. To fit with this review timetable it will be desirable that we have as many deliverables as possible complete and ready for dissemination by M18 (around November 2010).

Cooperation with the European Central Information Provider (ECIP)

Another issue relates to the proposed ECIP for science education, which is currently out to tender. The idea here is to centralise the online provision of resources for science teaching with the aim of reducing confusion and duplication. We have agreed that we will cooperate closely with the chosen provider, probably commencing in January 2010. This will mean that we can concentrate on the content of deliverables and on relations with key players, rather than on the mechanics of distribution. "Dissemination" therefore has a more active aspect as far as we are concerned. If you are interested in applying or just reading the (surprisingly interesting) tender document, it's at:

http://ec.europa.eu/dgs/research/tenders/rtd-2009_s1-000197_en.cfm

ECER/ESERA

Geir, Doris and Peter have submitted a paper proposal for ESERA 2009 in Istanbul. We would be interested to know if any of you have also submitted proposals so that we can think about how we can best use the opportunity of ESERA within the project.

The call for ECER 2009 in Vienna is still open (deadline 15 February) - we will also submit a proposal for a symposium there, probably on the topic of indicators and instruments and their role within the project, which fits well with the conference theme of "Theory and evidence in educational research".

Science - combined, integrated or compartmentalised?

The network of partners and like-minded colleagues is already in action, initiated by

a request for information from Fearghal Kelly, a very active and imaginative biology teacher in Scotland. Fearghal is interested in locating literature on the comparison between teaching science as discrete subjects and as a combined course. We have already had useful responses from Dalius Dapkus and Colin Smith. The topic seems to be under-researched but I am sure someone out there knows more...If you have any ideas contact me or Fearghal Kelly:

kelly@ross.elcschool.org.uk

Thanks for your cooperation

More metaphors: Plane or train?

Colin Smith has produced a thought-provoking article sparked off by my casual use of aircraft metaphors in relation to science students. I have included this at the end of the newsletter as I think that theorising pupil/student engagement is fundamental to what we are trying to do in S-TEAM.

INQUEST

No news as yet, but it's early...Given the favourable response to S-TEAM in Brussels, we clearly have a chance but as there were apparently 42 proposals in the previous round, there are more fish out there in the pond than we thought!

This raises the question of our relations with other fish, particularly those in science education who may well have felt that S-TEAM was coming from a different direction. We are anxious to avoid conflict and to encourage cooperation. If you know of colleagues involved in other bids or projects, we would be pleased to make contact in order to explore how we can collaborate to mutual advantage.

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Colin Smith

Exploring Peter's 'aircraft metaphor for science education'.

New, or not, to science education, Peter's 'extended metaphor (Steaminquest news no 1) seems to me to set us (both projects?) some serious challenges. Implicit in his observation that there are many projects already 'connecting teachers with research, identifying best practice in science teaching and so on' is an imperative to make our attempts different in some way. It is not enough to win the funding, engage teachers in and with research and disseminate good practice (whatever that is, since it can only be evaluated against our goals for science education which need to be clear and shared by all of us – project partners, teachers and other stakeholders- in the

process). Our projects have to find some new angle to make a genuine impact.

Needless to say, I don't have any answers that will stand out as original, but Peter has a habit of introducing interesting metaphors that are good fun to explore. So let's have a little fun in exploring his 'aircraft metaphor' a little more and see if it takes us anywhere useful.

Peter notes that we get on an airplane for two reasons – you want to go somewhere, or you have to go somewhere. These can be broken down a little further.

Want to go

A1 I know where I am going and I want to get on the plane (or coach or train) to go there.

A2 I think I know where I am going and I want to get on the plane (or coach or train) to go there – a misconception about the destination.

A3 I do not know where I am going but I want to get on the plane (or coach, or train) to be taken there anyway - a 'Mystery Tour'.

Have to go

B1 I know where I am going and I have to get on the plane (or coach or train) to go there- a job of work, a task, perhaps

B2 I think I know where I am going and I have to get on the plane (or coach or train) to go there – a misconception about the imposed destination

B3 I do not know where I am going but I have to get on the plane (or coach, or train) to be taken there anyway - an imposition, perhaps, that I might resist where possible.

Which of these is most analogous to pupil goals in science education? Possibly, given the complexity of reasons for being in school and in science lessons, all have some relevance.

A1 I know where I am going and I want to get on the plane (or coach or train) to go there. Even the most committed students cannot fully know where they are going, as implied by A1.

To really know where you are going, you have to have been there before. I might have some image of, say, Trondheim, but I can't really know what it is like to be there until, and if, that happens. In fact, even then I might not fully know what it is like. I have to live there for a while to begin to see it from the perspective of a resident, not a visitor. Having been to Grenoble, my image of it is probably better than it was but still not as good as Peter's or Michelle's, after their degrees of residency. Also, they are probably still learning about the town. Likewise, our students cannot really know in advance what it is like to have achieved a scientific understanding, although they may have a sketch of an idea based on their experiences to date. Even when they can be said to have had a science education and to think like scientists, the reality is that there is still more to be learnt about that particular destination.

Even though I can never truly know the destination until I reach it and live there, things can be done to make my pre-knowledge of it more secure. I can study books about Trondheim, try to find documentaries about what life is like there, and so on. Similarly, we need to find ways to make the goals of science education clearer to our students. Telling them something like, "At the end of this section, you will understand the theory of gravity", is a bit like saying, "At the end of this journey you will be in Trondheim." Perhaps, our aims should make it clearer what it will be like to understand the theory of gravity. Something like, "At the end of this topic you will understand the theory of gravity and this will enable you explain such things as why objects have different weights on different planets, why the planets stay in orbits around the sun, why we don't fly off the earth as it spins round, and so on.

Perhaps we, and our students, do not appreciate the extent that in science education the goal is one of a move to a life in a very new and

strange destination. It is well documented in the literature that we develop lay/folk/intuitive ways of understanding the same phenomena that science studies (for example, Atran, 1996; Disessa, 1996; Driver et al., 1985; Hatano, 1990; Hatano and Inagaki, 1996, Roth, 2008). The problem for science teachers is that these ways of understandings 'work' if they continue to be supported by a particular mix of physical and social/cultural affordances (Neisser, 1987). For example, everyday concepts of solid and liquid can continue into adulthood (Stavy, 1994), presumably because they are not challenged in everyday life. Indeed, everyday teaching experience can illuminate just how shallow in scientific (or any academic) terms the explanations can be that satisfy everyday needs. Certainly, in Scotland, even after 3 or 4 years of secondary school science teaching, some fifteen or sixteen year Biology pupils can still feel that a satisfactory answer to questions such as, "Explain why living organisms need food" is, "To keep them alive." That we die without food is sufficient explanation of our need for it. Ogborn et al (1996) describe the issue as follows:

....science teachers have to explain things that do not seem to need explaining at all. How do we see things? Why are our bodies warm? Why does coal burn? Why do hot things cool down? Why is the sky dark at night? Why do mammals have four limbs? Why are solids hard and liquids runny? Such things seem to common sense to be so obvious that there is no need to explain them. Indeed, nobody asks how to explain them because they are just the kind of thing we use to explain other things. Why shake the foundations unnecessarily? And yet, it is typical of the sciences that they do shake the foundations of knowledge in this way. (page 2)

So, it seems that A1 does not, and quite probably cannot, apply as a description of the

reality for our science students as they undertake science education's journey, no matter what they may think themselves. Also, B1 (I know where I am going and I have to get on the plane (or coach or train) to go there- a job of work, a task, perhaps) cannot apply either as it also implies certain knowledge of the destination. Learning science is not a job of work with a clear goal, from the student's perspective at least. Perhaps, we should,, therefore, be careful about the language we use in both the literature and the classroom. For example, phrases such as, "Your (learning) task ...", that are widely used (in English speaking classrooms, at least), and seem to originate in constructivist literature (for example, Driver, 1988), may imply a more certain route and journey than is the reality.

In fact, consider the following description that also uses the journey metaphor. A teenage girl's response to being asked to describe the difference between primary and secondary science is being described.

...primary science was like being in a small plane flying over a vast open landscape like a desert. You could land anywhere to have a look around and explore for a while. There was a sense in which it didn't seem to matter too much where you had landed, because it was the exploring that was important, not so much what you found. The fact that the knowledge you accumulated was patchwork, and had big 'holes' in it was not a problem.

Secondary science, on the other hand, was like being on a train in carriages that had blanked-out windows. You were going in a single direction, about which you had no choice. The train stopped at every station and you had to get off. Whether you liked it or were interested or were not, and pay attention to what the driver told you to. Then you got back on the train and went off to the next station- but because the windows were opaque you could

not see the countryside in-between, so you did not know how the stations were linked or related to each other. Obviously, you were on a purposeful journey, you were going somewhere, and the train driver seemed to know where it was. Worst of all was the feeling that you were supposed to understand the direction of the journey too, even though nobody had given you a map, or let you look out of the train as it was chugging along. So you would come to think that it was your fault that you could not put it all together. (Claxton, 1991, pages 25-26)

If this picture is typical, and my thirty odd years of teaching science unfortunately inclines me to the view that it is experienced that way by many pupils as we race through the curriculum in secondary education, then secondary science looks disturbingly like B3 – a compulsory mystery tour in which you never really get to experience the final destination or big picture. It is possible to imagine that the train driver may succeed at certain stations in really engaging the travellers so that they enjoy their time there and become familiar with them, but are still not able to achieve an understanding of the overall direction of the journey and how the stations fit together.

The description of primary science looks more encouraging – A3, a mystery tour with some choice to stop where you want. However, it contains the seeds of some problems for secondary teachers. Pupils do not always want to revisit places they have been before, even when there are holes in their knowledge. They can be like those, if they actually exist, American tourists who ‘do Europe in ten days.’

So where does this get us? Peter thinks that the social aspect of schooling is under theorised, and that is probably true. However, we are thinking here about what might be, perhaps, a slightly more direct issue – that of engaging

people in a journey which they might both have to and want to join. There are plenty of ideas around as to how to engage pupils in science but Peter’s metaphor might be bringing us from a slightly different angle. So what might be some of the features of a theory of engagement in science education?

Towards a theory of engagement in science education.

- 1) Although we cannot spell out exactly the goal of scientific understanding to our students in a way that is completely clear to them before they have actually achieved it (otherwise they would not need science education), we can do more to indicate what it will be like. Things they will be able to describe, explain and otherwise do that are not possible without scientific understanding. We, perhaps, cannot move the ‘have to’ aspect completely but we possibly can be more imaginative in describing the destination to make it seem more attractive.
- 2) We also have to be more upfront about the fact that we are taking them to a very different destination compared to where they are now. One in which what is thought important to describe and explain is very different to everyday contexts. The processes of science may be similar to those of cognitive development to the point that some use them as an analogue (e.g. Gopnik and Meltzoff, 1997), but the conceptual content of science is another matter. Learning science is not just a matter of conceptual change but is a conceptual change involving acquiring (constructing, if you prefer) a content that differs from everyday understanding in a variety of ways (see 4 below).
- 3) We have to be more proactive as ‘tour guides’ explaining the journey, why we

are taking this route, how the stations fit together, and so on. In other words, avoid the trap of presenting science as distinct topics with little or no connection between them.

- 4) All the above might mean developing a theory of the dimensions of content (White, 1994), as part of our theory of engagement. White identifies various dimensions of content, including openness to common experience, degree of abstraction, complexity, alternative models with explanatory power, presence of common words and mix of types of knowledge. I have speculated about the idea of educationally core throughlines (an extension of the concept of throughlines from the teaching for understanding framework, e.g. Wiske, 1998) for biology that are hypothesised to hold it together in an educational way by bringing together educationally core concepts. These ideas might be useful in developing new ways of mapping out the sciences for our students. We would then be describing not only the goal of the journey, but the mode of transport (the vehicle and its tracks or flight path).
- 5) A theory of engagement also has to incorporate propositions regarding the appropriate relationships between teacher and pupils and between pupil and pupil. Gray and Corbin (in preparation) are developing an interesting theory of fun in educational contexts that is based upon data gained from the EPL project. Fun emerges, in this context, as being 'the enjoyable focussing of attention on a dynamic situation.' It is collective and reciprocal between pupils and teacher, related to intrinsic motivation and focussed exclusively on the activity in progress. The authors comment that fun, broadly speaking, seems to be about being

active, social and engaged. Pupils may perceive themselves as having to be on the journey, but the appropriate form of educational fun may change this to wanting to be on it. It may reinforce those who perceive themselves as wanting to be on it.

As noted at the beginning, nothing here is particularly striking in originality, except, perhaps, Gray and Corbin's sketch for a theory of fun. To some (after all, we all have very different backgrounds), some (or all) of the points may seem obvious and trivial. However, the journey metaphor- particularly as one from the familiar to the different, even strange – seems to me to put a new perspective or spin on them. A perspective that leads us to think of our science students as people who cannot possibly fully know where they are going (nor can we specify this fully to them). Our job is to act as both tour promoters and tour guides to help them to get there, to understand how they got there, to understand the differences between there and where they have been, and to wish to learn more about the destination, once they have reached it. That is to live the experience of being somewhere new. The journey metaphor may contain, at least, the seeds of a new angle (figure 1) for making an impact. This piece will have served its purpose if it helps the debate in the project I assume that Peter was hoping to provoke.

Figure 1: Towards a theory of engagement

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(Note: if you are interested in the Gray and Corbin paper, I can send you a non-citable draft - Peter)