



Directorate for Education
Centre for Educational Research and Innovation (CERI), OECD

Innovative Learning Environments (ILE)

INVENTORY CASE STUDY

On the move!

Finland

“On the Move!” is an initiative to take secondary school students (age 13 to 19) and teachers out of the class-rooms to study and evaluate their local environment, for example, by mapping the area or by measuring air quality. The aim is authentic, collaborative and inquiry-based learning in the school neighbourhood, using modern technology and media in a pedagogically meaningful way. Students are stimulated to observe their environment in new ways, using many senses, and gain integrated and holistic knowledge in interdisciplinary projects. There is an internet platform that students and teachers use to share and discuss the project work. Students take an active role in setting goals, designing activities, and evaluating results.

This Innovative Learning Environment case study has been prepared specifically for the OECD/ILE project. Research has been undertaken by Antti Rajala, Anna Mikkola, Leena Tornberg & Kristiina Kumpulainen from the University of Helsinki under the supervision of Juho Helminen from the Finnish National Board of Education, following the research guidelines of the ILE project.

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OECD's Centre for Educational Research and Innovation – CERI
Innovative Learning Environments' Project (ILE)

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Finland

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Foreword

On the move! is not really a model, but rather a versatile service that acts as an umbrella for various types of models, good practices and learning materials. The basic idea is teaching and learning outside of school in different subjects, and especially in combinations of subjects. On the Move provides the tools and pedagogically functioning practices. The strength of the service in student's terms is an attractive and motivating opportunity to use technology and secure social media tools. As for teachers, the aim is to promote a culture of sharing, to diversify learning and teaching and make them more open and social.

The project results in a national web service, which will provide a learning environment, means to efficient sharing and dissemination of good pedagogical practices and a wide range of tools for teaching and learning gathered in one place.

Finnish National Board of Education

1 Introduction

This report is a part of the OECD's Centre for Educational Research and Innovation – CERI's international study on *Innovative Learning Environments (ILE)*. The report offers a description of an innovative Finnish learning environment – *Liikkeelle! (in English, On the move!)*. The structure of the report is outlined in what follows. Section 2 outlines how the data for the report were collected and analyzed. Section 3 examines *On the move!* at large, and Section 4 describes and analyzes one empirical case in detail. Finally, Section 5 summarizes the findings and we draw some conclusions about the possible impact of the *On the move!* project.

The present research was conducted within the “*Learning Bridges: Learning and Teaching at the Intersection of Formal and Informal Learning Environments*” project in collaboration with the Finnish National Board of Education (FNBE). The Learning Bridges project was a three-year (2008-2010) multidisciplinary research project funded by the Finnish Ministry of Education. The project was carried out at the University of Helsinki at the Faculty of Behavioural Sciences.

2 Data collection and analysis

We used various data sources in accordance with the OECD/CERI 'Innovative Learning Environments' project (ILE) Inventory Protocol. The data sources include a documents review and interviews with the project manager and project coordinator. In addition, we observed and video recorded the learning activities in one lesson of a learning project in an upper secondary school, which was conducted in cooperation with the *On the move!* project. Furthermore, we interviewed the students and teachers after the lesson. All interviews were either video or tape recorded. In addition to the new material, we utilized the interviews from our prior study on the *On the move!* project.

The recordings were transcribed, and all the material was analyzed with the categories given in the Inventory Protocol. However, we complemented the analysis with a close reading of the material that seemed important for the *On the move!* project as a whole.

3 On the move!

Aims of On the move!

- ✓ The primary aim of the *On the move!* project is to produce a nationwide web service to support secondary and upper secondary schools in reforming their learning practices in line with the pedagogical vision of the project.
- ✓ The pedagogical vision involves inquiry-based, multi-disciplinary pedagogy that takes learning out-of-school to “authentic learning environments.”

Key points in Section 3

- ✓ The *On the move!* project started in 2008 with funding from the Finnish National Board of Education. It has many partners, among them pilot schools.
- ✓ *On the move!* has produced the open learning environment *Link*. *Link* resembles the open environments used by students out-of-school, and serves as a forum for social networking among students, teachers and experts. Its features include a discussion forum, and possibilities for establishing friendship groups, publishing blogs, sharing files, pictures, and movies.
- ✓ *Link* entails a virtual interactive map of Finland developed by the *LocationLearning* project together with *On the move!*. Students can mark, for example, locations and paths of learning, emotional experiences, and results of scientific measurements.
- ✓ *On the move!* develops learning practices with its partners and distributes learning practices developed by teachers through its Internet service. In order to support teachers in implementing recommended pedagogies in schools, *On the move!* has developed the *Step-by-step* project model.

3.1 Aims and history of On the move!

On the move! (in Finnish, *Liikkeelle!*) is a collaborative project between the town of Kalajoki and the Science Center *Heureka*, located in the Metropolitan Area of Finland. Thus, it is a nationwide project that started in 2008 and is funded by the Finnish National Board of Education.

On the move! has a strong pedagogical vision behind all activities. Learning is understood as “happening everywhere all the time” without being limited to the classroom, lessons or school subjects. The website of *On the move!* (www.liikkeelleymparisto.fi) claims that taking learning out-of-school to “authentic environments” makes it more meaningful and content rich. Furthermore, learning is best promoted while collaboratively trying to understand and explain phenomena, exploring one’s prior beliefs, raising questions, and solving problems.

The primary aim of *On the move!* is to produce a nationwide web service to support secondary and upper secondary schools in reforming their learning practices in line with the pedagogical vision of the project. The web service provides tools for fostering inquiry-based and multi-disciplinary learning that takes place in the neighborhood of the school and in the wider society. Project manager Heli-Maija Nevala stresses, however, that although the technical tools are important in achieving pedagogical goals, these goals are more important than the tools.

The tools include:

- an open virtual environment featuring an interactive map that makes use of location information technology
- teaching methods and project ideas for enhancing multi-disciplinary cooperation and inquiry learning
- A model for planning, organizing and conducting a developmental project in schools

The project has three central themes. *Environmental investigation* activities are aimed at studying the learners’ everyday settings from the perspective of natural sciences. The activities include investigations of air quality and noise measurements conducted in cooperation with the

relevant experts and authorities responsible for these issues. *Diving into the everyday* activities examine the students' everyday settings in order to reveal those aspects that usually have an invisible effect on their lives and wellbeing. In *Society and us* activities, students study historical and contemporary societal actions, and identify traces of such actions in their everyday settings.

The starting point of *On the move!* was a funding opportunity announced by the Finnish National Board of Education for developing learning environments in Finnish schools. The town of Kalajoki and the Science Center *Heureka* applied for this funding together, and the funding received made pursuing the goals of the project possible. However, the project built on social networks and good practices developed in earlier, similar projects, such as those related to environmental education.

Half a year after it began, *On the move!* started to work with eight pilot secondary and upper secondary schools. During the first year, *On the move!* organized frequent meetings with the teachers of the pilot schools in order to inform them about the possibilities that *On the move!* could offer, give tutoring in using the virtual tools that were being developed, and discuss ideas to develop pedagogies and learning practices in the pilot schools. In the second year, some new pilot schools joined *On the move!* and some resigned from the project. At that time, 15 pilot schools were involved. The pilot schools continued testing the virtual tools and developing their own learning practices, and some learning projects were implemented across many schools. The meetings with teachers were also continued, but they became less frequent, as the funding for these meetings was cut. In the third year, the definition of pilot school had become a bit blurred, since there were huge differences among the levels of their involvement. Thirty-six new schools were recruited to implement a nationwide air quality measurement learning project (see, Section 3.3); these were selected out of 70 applicants in the order of enrollment, taking into account, however, geographical representativeness in order to ensure that schools all over Finland were represented. Nevertheless, at this time, all interested schools were allowed to join the virtual environment developed in the project (see, Section 3.2).

On the move! has engaged in collaboration with other partners, as well. An important partner has been *PaikkaOppi* (in English, *LocationLearning*) project, with which *On the move!* collaborated in developing the interactive virtual map. *LocationLearning* is funded by the Finnish National Board of Education, and their primary aim is to produce an interactive map for supporting teaching of geography, geographic information system (GIS), and environmental studies in schools. The map was originally developed by *LocationLearning* and a commercial software company, Arbonaut Ltd, which technically implemented the map. Moreover, the template for the map came from National Land Survey of Finland.

Other partners of the *On the move!* project are the Universities of Helsinki and Oulu. In cooperation with the staff of these universities *On the move!* has created or helped to create new teaching methods, such as *Time-space-paths* (see, Section 3.3), and a jointly organized course for student teachers of the arts and upper secondary school students. In addition to practical developmental and pedagogical work, the universities have contributed by studying *On the move!* and producing scientific knowledge and a survey report about the project and the new forms of learning it entails.

Finally, commercial actors are also involved in the *On the move!* project. In developing the web service, *On the move!* has bought expertise from a software company. Although the web service is based on freely available open source ideas, the software company has helped *On the move!* to further develop the virtual environment in accommodating to the needs of teachers and learners.

3.2 Open learning environment Link

The outcome of *On the move*, which has demanded the most effort on the part of the staff is the virtual environment *Linkki* (in English, *Link*). It was about to be published for nationwide use for secondary and upper secondary schools in January 2011 during the writing of this report. Before that the pilot schools and other voluntary schools and partners had the opportunity to test the environment while it was being developed.

Link is an attempt to enrich teaching in schools by providing a social media tool that is safe to use and easy to implement. It is based on an open source and free of charge social networking software, Elgg (see, <http://elgg.org/>). Elgg as such is flexible for use in a wide range of organizations. In order to develop a virtual environment serving their own purposes, *On the move!* cooperated with a commercial software company, Mediamasteri Ltd, which technically implemented the virtual environment *Link* using Elgg as a basis. *On the move!* states in their annual report that developing the Elgg-environment to suit nationwide use in schools has required an unexpectedly large effort both on the part of *On the move!* staff and the software company. Thus, *On the move!* has not been able to pursue its other aims, such as pedagogical development, as much as originally planned.

Link is a forum for social networking among students, teachers, and various kinds of experts. In *Link*, users can publish blogs, establish working or friendship groups, share files, pictures and movies, engage in discussions, and send messages to each other. Users also create profiles in which they can add their pictures and write things about themselves that do not necessarily have to relate to school. Moreover, one's own profiles can be used for other than study purposes. In many regards *Link* resembles other open social media environments used by the students outside of school, such as Facebook or IRC. According to the project manager Heli-Maija Nevala, learning environments used by schools are not usually open environments, though social media entails features that are in line with the contemporary conception of learning.

Heli-Maija Nevala describes the open aspect of *Link* as follows:

“In Elgg [i.e. in *Link*] everything is based on me [the student] as a person. So, I have my own profile, my own learning goals, my own learning projects, part of which can be given by the teacher but part can be such that I do them for the sake of fun. For example, I can share photos of my neighborhood taken from surprising perspectives or I can publish a blog about my experiences of everyday environments. That way we don't just study for the sake of school and just do what the teacher says. Instead, it is my own thing that's involved. Another way to produce and seek knowledge in Elgg [*Link*] is the groups. Groups are established based on one's own interest, for example, a learning project. And then, there will be a group established for each school.”

The screenshot shows a web browser window displaying a user profile on the Elgg platform. The browser's address bar shows the URL: <http://elgg.mcampus.fi/liikkeelle/pg/profile/heli-maija.asikaine>. The page title is "Liikkeelle! Heli-Maija Nevala".

The profile page is titled "Liikkeelle!" and features a navigation menu with options: Etusivu, Työkalut, Asetukset, Etä, Mene, and Kirjautu ulos. The main content area is divided into several sections:

- Profile Information:**
 - Heli-Maija Nevala**
 - Uusi Linkki iähes valmis... (139 päivää sitten)
 - rooli: opettaja
 - Kunta: Vantaa
 - Lyhyt kuvaus: Liikkeelle-hankkeen vetäjä Heurekassa
 - Kiinnostuksen kohteet: oppiminen, isikki, puutarha, kaupunki, maailma, yhteistoiminta
 - Taidot: ajattelu ja tekeminen
 - Web-sivu: www.liikkeelleympanisto.fi
 - Koulu: Heureka, Liikkeelle!, Harjoittelukoulu
 - Työtilat: Ilmanlaatu tutkimukseen osallistuvat koulut, Reittikuvaus, Testi
- Tietoa minusta:** Liikkeelle! on unelmatyö. Saan oppia koko ajan uutta, saan tehdä töitä oppimisoiloisten ihmisten kanssa (esimerkiksi pilottikoulujen opetti!), koko ajan tapahtuu Innostavia uusia asioita. No, tietysti on niitä vähemmän jänniäkin työtehtäviä. Mutta kaiken kaikkiaan on todella kiinnostavaa ja jännää olla töissä tässä hankkeessa.
- Ryhmät:**
 - Tutki, löydä, opi -kursseja kevät 2011 Opettajien täydennyskoulutus 17.1.-20.5.2011
 - Tutkimussuunnitelma (Hankkeen hallinto)
- Kaverit:** A grid of profile pictures of other users.
- Kirjanmerkit:**
 - Ympäristöekologian kurssi (Kokkolan yhteislyseon lukio) Heli-Maija Nevala 39 päivää sitten
 - Etelä-Tapiolan lukio Heli-Maija Nevala 39 päivää sitten
 - Otan kantaa ja vaikutan (Kajajoen lukio) Heli-Maija Nevala 39 päivää sitten
 - Kannuksen lukio Heli-Maija Nevala 39 päivää sitten
- Kuva-albumit:**
 - Ajan kuvat Luotu 166 päivää sitten
 - Arkiaamu Luotu 353 päivää sitten
 - Näytä kaikki albumit

The open learning environment *Link*

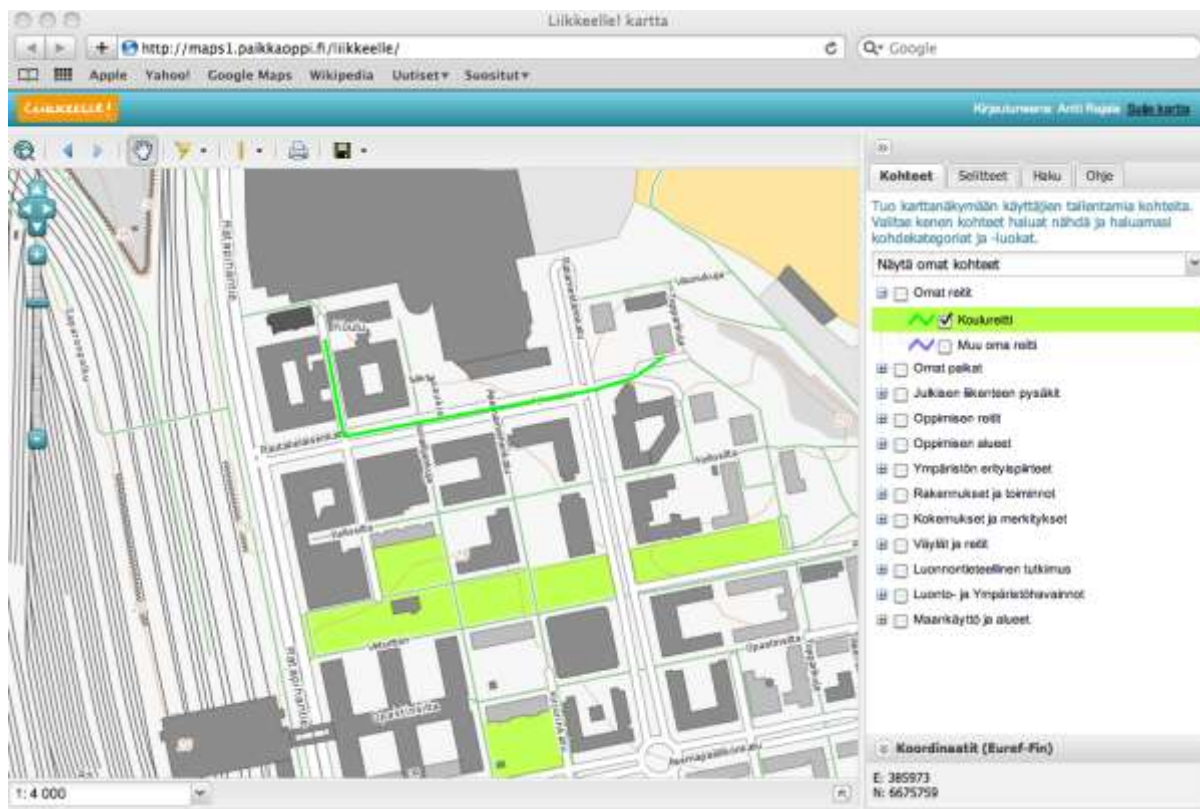
Project coordinator Tiina Hyttinen in turn stresses that the possibility of defining friendships and sending private messages to friends has been very popular among students, although teachers often conceive of it as unimportant. Interestingly, some teachers have reported that as the students experience *Link* as an informal way to communicate, dealing with difficult and sensitive issues, such as homosexuality, becomes easier there than in the classroom.

Developing an open environment for use in schools has created unexpected dilemmas pertaining to legal and safety issues. *On the move!* has strongly emphasized safety. This has been achieved with a system of registration and user control. The administrator of *On the move!* is responsible for accepting new schools and teachers to the environment, while teachers in turn administer the users of their own schools. At the time of writing this report, creating terms of use for *Link* is still under negotiation, and in order to clarify the issue, *On the move!* has consulted a lawyer specialized in social media. Furthermore, safety has been promoted by creating instructions for schools on how to use the environment safely.

One prominent dilemma deals with students publishing their work, which is an important aspect of *On the move!* pedagogy. Initially, *On the move!* aimed at making it possible to publish the content produced in *Link*, as this would have promoted cooperation across the border between the school and outside world. However, this can create problems with exposed identities, if pictures or names of school children are accessible on the Internet. In order to avoid problems, *On the move!* will not initially provide a publishing feature in *Link*. Thus, the visibility of students' discussions, profiles and products will be limited to registered users. Currently, *On the move!* staff are working on this dilemma, and may add the publishing feature in the future, provided that this can be done safely.

Link also entails an interactive map of Finland produced by the *LocationLearning* project in cooperation with *On the move!*. The interactive map covers all of Finland, and makes it possible to zoom in and out with it, for example, to see street names and buildings. Moreover, it is possible to mark locations and paths, such as school paths, on the map. Templates are also available for adding a wide range of marks, such as bus stops and train stations, environments

and paths of learning, emotional experiences attached to a location, results of scientific measurements, and nature observations.



The interactive virtual map in *Link*, © MML, permission number 53/MML/11

As *LocationLearning* originally developed the map for use in teaching geography, lots of geographic information and language are embedded in the map. *LocationLearning* and *On the move!* jointly reconfigured the map, deleting some features and adding others. Project manager Heli-Maija Nevala describes the initial cooperation between the two projects as challenging due to diverging aims:

”... Their [*LocationLearning's*] aim is to develop an interactive map for teaching geographic information system (GIS). In our project, we use the map in such a way that students bring to the map the results of the studies of their everyday learning settings, whether they be subjective or anything ... The cooperation [between the projects] started with the idea that we could deploy that interactive map. [Between the projects,] There were not that many pedagogical connections. Their aim was to

produce the map, and their starting point came from the discipline of geography. We have removed from the map all functions that don't serve our school project. We have removed, for example, the source data created by professionals. Instead, our emphasis is on the creation of knowledge. I mean that the students create that knowledge."

Despite the initial challenges, cooperation between the two projects has been fruitful. At the time of writing this report, the parties are even negotiating about a possible fusion of the projects in the near future.

3.3 On the move! learning practices

On the move! has developed methods and project ideas for teaching that promote explorative and collaborative pedagogy in "authentic environments." These new methods and ideas as well as independent innovations by practitioners are shared through their website. Furthermore, the website provides a forum for teachers to share their teaching experiences and insights. *On the move!* users are also informed about face-to-face meetings and educational events.

Below we describe two examples of these methods: measuring air quality and *Time-space-paths*.

Measuring air quality

The largest scale learning practice provided by *On the move!* is an investigation of air quality. *On the move!* created a wide network of experts and authorities to facilitate investigations conducted by schools and to virtually discuss the results with students through the *Link* learning environment. Thirty-six schools all over Finland participated in the project in October 2010. Air quality was measured with measurement devices placed in student selected locations in the neighborhood of each school, and left there for one month. The measurements were then sent to experts at the National LUMA Center (a center for supporting schools in the teaching of natural science and mathematics) for analysis, after which the students published the results in an

interactive map. This allowed the students and experts to use *Link* for carrying on a virtual discussion about the results.

The nationwide air measurement project required collaboration among many actors. For example, within the *On the move!* project group, chemistry teacher Päivi Ojala contributed by bringing in her scientific expertise and wide social networks of experts. Moreover, unlike many other kinds of measurements, such as measuring of water quality or temperature, measuring of air quality is not possible without equipment that is not normally found in schools. *On the move!* had earlier invested in air quality measurement devices which they lent to schools. However, these devices needed to be installed somewhere before use, and the National LUMA center was the solution to the problem. Experts from the Helsinki Region Environmental Service Authority, among others, contributed to the project by answering students' questions and training teachers.

Before conducting the nationwide measuring project, the method was piloted in the pilot schools on a small scale. In the following, we describe the air measurement activity in practice as reported by one of the pilot teachers, Liisa Rantamäki, who taught geography in the Kallio Upper Secondary School of Performing Arts in Helsinki. This school is specialized in drama and artistic expression, and it accepts only those students whose achievement in secondary school has been excellent.

Liisa Rantamäki describes the air measurement activity as an opportunity to do significant activities with students which otherwise would not be possible. She stresses the importance of field experiments as essential in natural sciences. According to her, for example, in normal teaching students passively write down what the teacher says and only occasionally have a chance to do some calculations. In contrast, in field experiments, the students first need to collect the research material and process it before it is in the form that is usually presented in textbooks. She states, however, that the school curriculum in Finland does not necessarily support field experiments, as there are pressures to cover too many topics superficially. Another reason is that a school may be poorly equipped with instruments or far from good field sites.

Thus, participating in the measurement of air quality encouraged Liisa Rantamäki to teach in new ways. The measurement devices provided by *On the move!* made conducting field experiments possible, and the results could be documented in the *Link* interactive map. Furthermore, *On the move!* provided instructions and training in how to use the devices and analyze the data produced. According to Liisa Rantamäki it is not realistic for individual teachers to make contracts with other organizations for procuring instruments and expert support. Hence, projects or organizations such as *On the move!* are needed to support teachers if they are to conduct field experiments in this way.

The activity afforded the crossing of many kinds of boundaries. Liisa Rantamäki describes the working culture in Finnish upper secondary schools as fragmented into isolated chunks. First, conducting long-term projects with students is difficult, as the school year is divided into five chunks, and each course needs to be held within one chunk. With the measurement of air quality activity, Liisa Rantamäki distributed the collection of data and their analysis across two different courses to bring coherence to students' study paths. Second, the interactive map was used as a shared problem space for different student groups. One group of students did the field experiments and stored the results; then the results were processed by others and used as a starting point for other learning goals.

Another kind of boundary crossed was that between participating in school activities on the one hand, and contributing to adult activities outside of school on the other. Liisa Rantamäki's students engaged much more seriously in measurements that were similar to those reported in the national media. For example, the students asked more insightful questions, and after placing the measurement devices in the field, they frequently asked her if the results had already arrived.



Students setting up measurement devices

The measurement activity gave the students an opportunity to participate and simulate expert practices. Researchers (Engeström, 1991; Kumpulainen et al., 2010) claim that school assignments and textbooks often simplify reality, which may facilitate the acquisition of the point in question but offers a picture of the phenomenon that does not correspond to diverse and complex reality. Liisa Rantamäki points out that as a result of the activity, the students realized that conducting the measurements and documenting the results was surprisingly hard and messy:

“The students saw that this is it: How a field experiment needs to be planned in advance. It is not enough to put measurement devices somewhere. The results need to be processed. There are many things that can go wrong. And before the results are published, the measurements need to be conducted repeatedly. You also need to take into account disturbances. This made experimenting very concrete.”

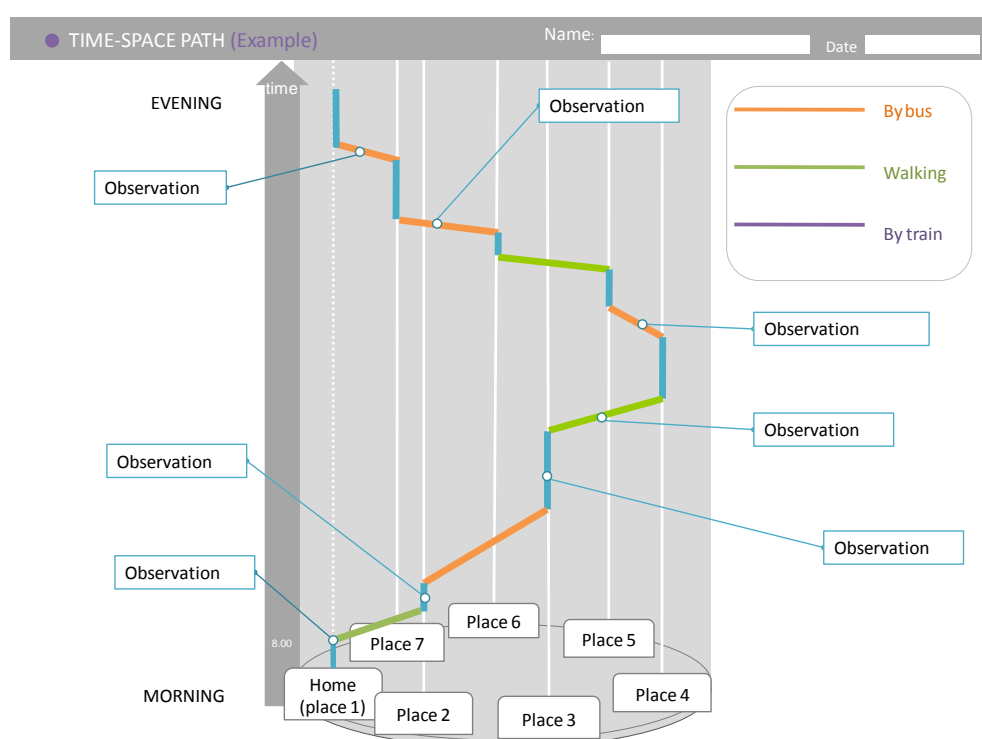
Also, surprising disturbances and dilemmas are characteristic of experts' work. Liisa Rantamäki describes a field trip in a noise measurement activity of *On the move!* as follows:

“It helped the students understand that, hey, this is it. If they didn't get anything else from the noise measurements, at least they saw how carefully this kind of a field experiment needs to be planned. That it is not just, let's go and put the device somewhere and then the results are there. Instead, the information needs to be processed quite a lot. Then there are quite many things that can go wrong, or there are various disturbing factors ... We brought the devices there to those three measurement sites with one chemistry group. At one of the sites, we had a situation that I hadn't thought about in advance; we needed longer stepladders there, because we had to climb up to a branch of a tree. Then we all wondered where we could put that measurement device around here. There wasn't a good place. Then we noticed a place at the corner of a kiosk, but we didn't have permission to put it there. We agreed that we'd take the risk. We put it there and I will contact the kiosk owner.”

Time-space-paths

Cooperation with the University of Helsinki produced a pedagogical innovation called *Time-space-paths* in which secondary and upper secondary school students investigate their everyday experiences and, as a result, create a visual representation of their everyday environment as observed during one day. This teaching method was developed by Outi Surma-aho (2010), then an undergraduate student, as her Master's thesis together with her supervisor Sirpa Tani (Tani, 2007). Sirpa Tani is on the supervisory committee of *On the move!*. The teaching method is based on the scientific school of time-geography originally developed by Torsten Hägerstrand in the 1970s, and further developed by Sirpa Tani, among others. Here, the description of the method is entirely based on the master's thesis of Surma-aho (2010). The method was developed in close collaboration with *On the move!*. The empirical work regarding the development of the method was implemented in pilot schools of *On the move!* in Metropolitan area of Finland and the town of Kalajoki. In addition to providing the pilot schools, *On the move!* supported the preparing of the study by giving comments. Furthermore, the graphics designer of *On the move!* contributed to the method by designing the worksheets for students' paths.

In the method, the teacher first describes his/her everyday environment and stresses the easily invisible nature of the everyday. Then, connections are made to geography as a school subject, and the students are introduced to relevant concepts, such as "space," "local identity" or "constructed", "natural" and "social environment." The students are instructed to use several observation methods to collect data from their everyday lives. The teacher, preferably, gives examples from his/her own life by, for example, showing photos. Finally, the students are told that they are expected to produce a visual representation of their everyday environments, as observed during one day. The teacher can clarify this by showing an exemplary time-space-path constructed from his/her own life.



A model of a time-space path was offered for the students. The original version was in Finnish.

The time-space-paths can be created either with paper and pencil or with computer tools. PowerPoint software was used, because it is relatively easy to use and accessible in most schools. The students were provided with templates for diaries and time-space-paths.

The study reports that the method was suitable in secondary and upper secondary schools, and the students were able to create time-space-paths from their everyday environments. The teachers were motivated to learn the method and were supported by the researcher. This motivation is evidenced by the fact that all eight pilot schools eventually used the method, apart from only one school, which withdrew due to time constraints. Furthermore, in some schools the teachers have independently continued working with the method.

In addition to providing adequate research data for a geographical research study, the findings of the study suggest several pedagogical implications. First, *Time-space-paths* may increase students' awareness of social, emotional and activity-related affordances of their everyday environments. Second, with the help of these tools, students can learn to express and reflect on how they experience these environments and moving across them. Third, taking pictures and describing their environment may encourage students to express themselves and reflect on their belonging to the environment and their local identity. Finally, making summaries of the paths fostered students' critical thinking. In short, students can be guided to see in new ways and thus, give value to their everyday environments.

Time-space-paths can also be used as a tool to connect formal teaching to students' life worlds and embodied experiences, and thus, make formal knowledge more accessible and emotionally closer to the students. Using *Time-space-paths* in school provides many possibilities for using students' everyday life as a resource for reflection and fostering disciplinary understanding. Although the report on the method (Surma-aho, 2010) suggests such pedagogical uses, and the teachers of the pilot schools were even encouraged to further work with the paths, the report does not tell us whether the teachers of the pilot schools actually used the paths in this way. Among the pedagogical uses of the method listed by Surma-aho (2010), one is an opportunity to encourage students' democratic participation, if they collect observations of aspects that need to be improved. This idea has been put into practice in the *Fillarit Liikkeelle!* (in English, *Bicycles on the move!*) project that we describe in Section 4.

3.4 Step-by-step project model

In addition to designing specific teaching methods and project ideas, *On the move!* has developed a model for planning, organizing and conducting a school project in line with their pedagogy. They call this model *Askeleet* (in English, *Step-by-step*), and it provides schools with step-by-step instructions in revising their teaching practices as a joint project between teachers and school administrators. The rationale for developing the model is that realizing a pedagogy that is in line with the pedagogical vision of *On the move!* in a school setting is very challenging, as there are numerous constraints stemming from, for example, traditional ways of working, the school's operating culture, time schedules, or the curriculum. In order to find novel solutions to these obstacles, the model was developed in collaboration with the pilot schools

The first phase of the model is the mapping of existing good practices and possibilities for cooperation within and out-of-school. According to the model the teachers meet to discuss the intersection among their interests, phenomena pertaining to the school's everyday environment, and the curriculum of each school subject. The second phase entails planning of the project, setting goals and schedules. A recommendation is given that the students can also participate in the planning. The goals include learning goals for the students, goals for developing the operating culture in the school, and goals for the professional development of the teachers. Finally, the model instructs teachers in the implementation and evaluation phases of the project. It is suggested that the working group evaluate the project already as it is ongoing and that the media is informed about the project.

At the time of writing this report, the *Step-by-step* model had just been published for nationwide use in Finnish schools. During spring 2011 it will be integrated as part of a virtual in-service education course for teachers.

In the following section we examine one learning project that was inspired by the *On the move!* project but designed independently by teachers in a pilot school. This learning project, *Bicycles on the move!*, is presented as an exemplary project in *Step-by-step* instructions for teachers.

4 Bicycles on the move!

Key points in Section 4

- ✓ The *Bicycles on the move!* project aims at introducing students to project work and developing their project management skills.
- ✓ The project also aims at increasing students' co-operation with different actors of society, as well as increasing their knowledge concerning their rights and duties as members of society.
- ✓ During the project students collaborate with representatives of various institutions and aim at influencing the city's decision-making concerning issues related to bicycling.
- ✓ The first implementation of the project was a huge success, and aroused interest in the media locally, nationally, and even internationally.
- ✓ The students are not positioned in traditional student roles. Instead, the teachers share expertise with the students, positioning them with authority and accountability for being capable of reasoning and taking action. However, during the observed lesson, the students were somewhat reluctant to take up that position.
- ✓ In the project, a variety of learning resources are utilized. These include the open learning environment *Link* and the interactive map. Furthermore, extensive use is made of connections across a wide range of contexts of learning and acting both locally and globally.

4.1 Pedagogical aims and overall picture of the project

The Etelä-Tapiola Upper Secondary School in the city of Espoo took part in *On the move!* as one of the project's pilot schools in 2008. Mikael Sorri, a teacher of philosophy, psychology, religion, and ethics, and Pentti Heikkinen, a teacher of biology and geography, saw this as an opportunity to widen the school's educational spectrum as it had a long tradition in sustainable development, and social and civic matters. What was of special interest for Mikael Sorri and Pentti Heikkinen in *On the move!* was its pursuit to take learning out-of-school to an "authentic environment." Pentti Heikkinen illustrated this as follows:

"Well, it was started when *Heureka* was looking for co-operation in this *On the move!*, to explore these environments – whether it's a cultural path or climate ... something that would happen in the immediate surroundings. And then we just ended up with it, and Mikael, he was already enthusiastic about cycling and accessibility. So two years ago we went for bicycling, that is, it's our thing."

The overall goal of the *Bicycles on the move!* is to introduce students to project work and to develop their project management skills. It also aims at increasing students' cooperation with different actors of society, as well as increasing their knowledge concerning their rights and duties as members of society. During the project, students collaborate with representatives of various institutions and aim at influencing the city's decision-making concerning issues related to bicycling. The students' course activities also include documenting their bicycling experiences and taking pictures of the neighbourhood.

What is unusual in the teaching practices of the *Bicycles on the move!* project is that two teachers are equally responsible for the execution of the course. This is possible, since the teachers volunteer to work at a lower salary in order to work together. In addition to weekly sessions in school, an important part of the course is the students' activities between the sessions. Moreover, the students are expected to contribute to the open learning environment

Link.

As an important pedagogical aim Mikael Sorri and Pentti Heikkinen raised the issue of developing students' sense of citizenship. They find it important that students learn that they can make a difference in matters and that they know what tools they have for reaching this goal. The teachers characterized learning in *Bicycles on the move!* as "taking small steps," and emphasized the importance of students' mundane observations on the surrounding environment.

4.2 The structure of the project

Bicycles on the move! is an elective social studies course at Etelä-Tapiola Upper Secondary School, which is an academically high-profile school with a track record when measured by the results of the national matriculation examination. *Bicycles on the move!* was implemented during the school year 2009-2010 as a one-year weekly course. The first implementation was a huge success, and aroused interest in the media locally, nationally, and even internationally.

The highlight of the first course was a city exploration trip to the Netherlands in April 2010. The aim of the trip was to investigate the bicycling culture and compare observations made in the Netherlands and Finland. The students were accommodated in the homes of students of a friendship school. Together with the Dutch students they made bicycle trips and could closely observe the local way of life pertaining to cycling. The Finnish students concluded that in regard to cycling, Finland is a developing country compared to the Netherlands. They noted, for example, the many special traffic arrangements for bicycles and the consideration that Dutch car drivers show towards cyclists.

The trip afforded a joint enterprise for the students and teachers, and thus, motivated the students for the duration of the entire course. Firstly, the students needed to join efforts in raising funds for the trip. Secondly, the trip gave a broader meaning and brought coherence to other course assignments. For example, students' own bicycling experiences and the observations made in the neighborhood of the school could be compared to the situation in the Netherlands. Finally, the students reported their observations at an event at the Finnish Science Centre *Heureka*, and their report was published as a main story in a local newspaper.

The observations and interviews for this report were made while a second implementation of the *Bicycles on the move!* was being conducted. Thus, the second implementation is documented here in more detail. The second implementation is taking place during the school year 2010-2011. A major difference between the first and second implementations is that the teachers had decided to drop the trip to the Netherlands. An initial idea was to utilize the material produced during the first implementation, such as the photos taken by the students. The teachers wondered whether dropping the trip would pose problems for the second implementation, as the project could be more challenging when the students executed their project assignments alone or in pairs. Thus, it might be worthwhile to have some kind of a common goal in the second implementation, as well. One possibility could be organizing a theme week with cycling events with the Dutch students, when they make a return visit during the second implementation.

At the time of collecting data for this report at the end of the fall semester 2010, the course had already met three times. The second implementation, so far, had not been as smooth as the first one. Nineteen students had enrolled in the course, but five had already dropped out.

The teachers expected each student to undertake a major project assignment either individually or in pairs. For this purpose, the students were allowed to come up with their own ideas about the nature of the assignment, but the teachers also provided them with ideas and resources. Some students had already taken up the challenge. For example, one of them had designed a study concerning the economic impact of cycling. During the lesson the teachers used this student as an example in order to encourage others that had remained more passive.



The students on a trip in Kinderdijk in the Netherlands

4.3 Planning with the students: an example of a lesson

The aim of the observed lesson was to plan the course assignments with the students and establish the learning environment *Link* as a shared tool for the course.

The tables in the classroom were arranged in a horseshoe facing an interactive white board. Both teachers and only six students were present during the lesson. The rest of the students were absent due to a rehearsal for a school event. On the white board, the teachers projected an interactive map of the local neighborhood onto which bicycle routes were plotted with red lines. Here they made use of the interactive map web resource afforded by the project *On the move!*

Interactional patterns during the lesson

The lesson was organized as a whole class interaction between the teachers and the students. The lesson mainly entailed the teachers talking about what kind of decisions the city was making at the moment and what kind of possibilities this created for students' project work. Occasionally the teachers asked students' opinions and discussed these issues with them. The students took a more active role at the end of the lesson when one of the students showed a short documentary film that she had found on YouTube. The film created a lively discussion among the students and teachers.

Although the teachers did most of the talking, the students were not positioned in traditional student roles. Instead, the teachers shared expertise with the students, explicitly positioning them with authority and accountability for being capable of reasoning and taking action. The shift away from traditional students' positioning was also evidenced by several implicit indications. First, the teachers projected the students to function as agents in demanding future situations. Second, the teachers problematized knowledge by speaking in a tentative fashion, thereby inviting exploratory ways of talking.

Student positioning is illustrated in the following excerpt from the lesson:

Teacher 1: Have you had any insight so far on what you could do? [a long pause] Have you even thought about this?

Student: I have thought about it umm about Ring I, it's being built, there are big constructions going on. If from that now

Teacher 1: [interrupts] Do you mean there at Leppävaara?

Student: Yea yea, that's right. There is the motorway intersection and then um the tunnel. If that could be something?

Teacher 1: Yes yes, what about cycling or that?

Student: Yes exactly, public transportation or I mean light traffic solutions

Teacher 1: Yea yea that would be good to look at and the plans around it

Teacher 2: Really brilliant idea, I already looked at it last summer and I have already sent some emails about it but it doesn't really mean that nothing should be done about it

Teacher 1: Yes but aren't the plans already made, so no one can influence them anymore? Of course one can lament that nothing is being done. Mikael made that complaint; it was nice because it has probably aroused some discussion about why in Tapiola there is not, that things should be improved for cyclists.

In the excerpt, the students are presented as persons who are capable of having insights. However, it is noteworthy that the students are hesitant to take up this position, which is indicated by a long pause after the teacher's questions. Hence, the teacher needs to repeat the questions. This hesitancy is a recurrent pattern during the lesson. Indeed, in the event of the excerpt, for example, only one of the six students comes up with an idea for a project assignment.

The student's response enacts a dialogue between him and one of the teachers. The dialogue has an exploratory character, as good ideas are acknowledged while at the same time the contributions are being critically examined. The student and the teachers co-construct knowledge as equals. The other teacher even goes as far as reporting having thought about the student's idea himself. Finally, the student's idea for a project assignment is rejected, as it is not connected to a present decision-making process but instead to a past and already closed issue.

The excerpt illustrates that the position for the students is quite demanding. The students are provided with authority to state their opinion and made accountable for doing so, but that entails that they have something to say. In the group interview the students talked about this when asked if they were going to establish a blog as suggested by the teachers:

“It would be quite fun. But I don’t know what I would write there in the blog. ... You must think, if you would do it, what is it that you would write. Where to begin? It is no use to start doing it if there is no sense in it.”

The teachers promoted the critical thinking of students. First, they explicitly encouraged students to compare and reflect on texts and on what they had heard rather than taking them as a given. Second, they implicitly provided a model for questioning authoritative sources of knowledge. As a consequence, the lesson became a dialogue between several voices, both present and absent. Absent voices became present as the teachers reported to the students their discussions with authorities, for example. Then, these voices were critically evaluated and processed together by the teachers and students. One example of part of such a dialogue is shown below in which one of the teachers discusses the opinion of a city planning authority whose presentation the students had heard in a seminar.

Teacher: He [the authority] thinks that cycle lanes are not worth building in areas where the rate of traffic is low. But not in the Netherlands. There they build cycle lanes anyway.

In the group interview, the students themselves describe the interaction between students and teachers as informal and relaxed, as compared to what they are used to in other courses; although the teachers speak quite a lot, the students also have a chance to give their opinion without asking for permission to speak. According to the students, the mode of interaction is conversational; the teachers sometimes remain in the background as the students converse as a group. In contrast, the interaction is usually more formal in other courses. This means that due to the tight schedule it is the teacher that mainly speaks and there is no room for conversations to emerge. Surprisingly, the students said that in other courses they often did not have any possibility for peer conversations.

Think globally, act locally: dialogue as a bridge over learning contexts

Perhaps, the most unique characteristic of the *Bicycles on the move!* project is that in it, extensive use is made of connections across a wide range of contexts of learning and acting. During the observed lesson such contexts were discursively evoked and juxtaposed in the classroom dialogue. This observation is in line with the claim posited by learning researchers that in inquiry learning, dialogue as such can provide a bridge across past, present, and future learning contexts (Kumpulainen & Lipponen, 2010; Kumpulainen et al., 2010).

The excerpt shown above is a good example of this. In the excerpt, reference is made to a student's and teachers' experiences and observations of a specific location, namely a motorway intersection near the school. These are juxtaposed to the decision-making process and past actions taken by one of the teachers. Interestingly, in the dialogue, contexts are presented as malleable to civic action mediated by democratic decision-making processes. Thus, students are presented an opportunity to learn about democratic participation and posit themselves as agents who can influence their surroundings.

The following settings were identified as being recurrently talked about during the lesson:

- Events that the teachers had attended
- Events that the students had attended
- Texts in *Link*
- Upcoming course events
- International comparison
- Neighbourhood of the school as a site of observation and investigation
- Sites for political decision-making

The teachers had been exceptionally active in being involved with cycling issues. They told students about their observations, such as counting the number of male and female cyclists or their feeling of insecurity while cycling without a helmet. Moreover, they recounted their discussions with local politicians, and actions they had taken to influence local decision-making.

The first implementation of *Bicycles on the move!* also provided many stories to be told. When asked by the teachers, the students, in turn, told about their experiences of the events they had participated in between the lessons. The students had selected these events from a list given by the teachers, which included cycling seminars nearby and in Helsinki and an open lecture arranged by the school. Only occasionally did some students take the initiative in recounting their own experiences without being elicited by the teachers.

References were also made to the learning environment *Link*. The teachers mostly made these references. For example, one of the teachers told students about a blog that he had written there. However, it became evident that the students had been less active than expected in *Link*, and the teachers urged them to make better use of it by taking part in discussions, putting pictures in the interactive map or establishing a blog.

The teachers used upcoming course events for providing a sense of meaning and purpose for the individual course assignments. For example, the course was supposed to meet the manager of a huge nearby shopping center to discuss how cyclists are taken into account in the traffic arrangements. In order to prepare for this meeting the teachers encouraged the students to become "experts of the Tapiola area."

Another important way to frame the course assignments as meaningful was international comparison. In the first implementation of the course, the trip to the Netherlands provided an easy comparison. Yet, in the observed lesson a constant reference was made to how cycling issues were resolved in other countries. This was mainly achieved through the teachers' experience of taking part in the Netherlands trip. However, students also contributed to the comparison. One of the students showed a short documentary film about cycling conditions in Copenhagen. Watching the film evoked conversation among the students and the teachers, in which comparison was made to the experiences of the students and the arrangements of their neighborhoods.



Students negotiating with authorities at Tapiola Info Center

Much of the discussion was about the activities that the teachers urged the students to do after the lesson. The teachers provided numerous possibilities for conducting the project assignment, but it was left for students to select how they were to perform the assignment. Each student was required, however, to document the school neighborhood with a camera, taking pictures of obstacles for bicycles or solutions that facilitated cycling. In all discussions an underlying intention was to take part in local political decision-making. The teachers were very well aware of what was happening in city politics pertaining to cycling. This helped to frame the assignments as politically meaningful. For example, the pictures that the students were supposed to take would be used to take a stance in a current political debate about the route for a large street construction project in the Tapiola area. As there is as yet no plan for the route, the teachers stated that the authorities would be eager to listen to the students' suggestions. By providing

students with tasks to which nobody knew the solution, they were radically altering the common pattern in school of asking questions with known answers.

Resources for learning

As described above, dialogue was a major resource for learning. The teachers provided models for critical thinking, and the students were entitled and expected to take part in exploratory dialogues. Furthermore, the mere possibility of engaging in talking promoted social relations among students:

“You can get to know other people better when you don’t sit in the classroom where you cannot see what’s behind your back. Here, you see the others and you can talk with them. The conversation takes place with everyone, and the teachers are not necessarily always in a key position. ... In normal lessons there is not so much interaction between the students.”

Students had many opportunities to observe and participate in social influencing. For example, Mikael Sorri drafted a fifteen-page statement concerning cycling conditions in Tapiola in an area where the city was planning a metro line. The statement was handed over to the city of Espoo’s planning committee in fall 2010. And although the statement was not a joint project of the group, students were given an opportunity to comment on the text; in this respect its potential nature as a good example of social influencing cannot remain unnoticed. As another example, Mikael Sorri described the time when the TV channel Euronews came to observe and interview students for its news clip in fall 2010, and he illustrated the philosophy of the project and the connectedness of it when he said: “... there was this influential thing about it, not a school subject where you learn something that is written in a book, but it was connected with society directly.”

The *Bicycles on the move!* course was different from what the students were used to. In other courses, the dominant resources for learning were the textbook and listening to the teacher lecturing:

“We are in a classroom and then use the textbook and make notes, and the pace is quite fast. There is always the one book per course. ... In chemistry, we may do some experiments, but mostly you sit in the classroom, write and listen.”

In *Bicycles on the move!* many kinds of both written and spoken texts were used. Instead of textbooks the starting point for learning in the course was students' and teachers' own experiences and observations, up-to-date political debate and an international comparison of good solutions for cycling. The multi-voiced interaction promoted critical awareness of the intentions behind the knowledge sources and fostered the students' own voice:

“Maybe you got insights. You can get yourself to think about things. They [the presenters in the seminar] brought in their opinions but of course also facts. ... I think that the idea was that we go there to listen and then we think about it ourselves as well. In a way we got into this project better when we went there to listen. For example, I don't know so much about cycling, about the facts and such. So it was good to listen to many kinds of thoughts. ... I think that when you read a textbook, the information is there, it's a fact, you don't question it. But when somebody else says it, when you attend some events, there can be something, and you start to explore it, and then you get more knowledge.”

Furthermore, much emphasis was placed on students' own actions between the lessons. At the end of the observed lesson one of the teachers urged the students to be more active:

“This demands a contribution on your part. We can't make any progress during the lessons if you don't do something in your free time, if you don't produce any material ... in May we'll be wondering what we could have done.”

The students acknowledged the significance of their own actions in the interview:

“In a way, in this you don't learn much unless you yourself start doing something. For example, in a biology lesson you can open the book, but in this you cannot do that.”

Technological mediation provided another important learning resource. The teachers relied on the everyday mobile technology of the students, as they assumed that each student would have a mobile phone with a camera. Moreover, both the discussion forum and interactive map of *Link* were used during the course. Using social media, such as blogs, was familiar to the students. Although they stressed that one must have an idea of what to say, they also added: “It’s not a far-fetched idea. It would be an easy way to write down your own thoughts so that many others can read them as well.” Social media was further utilized to provide students the possibility of bringing in teaching materials in the form of YouTube videos, which they did.

Although using an interactive map in school was new to the students, they saw the value in using it:

“Well, for example, it’s a place where we document the problems in cycling. It provides quite strong grounds for doing this thing. We depend on it. We put all those pictures and other things there, and so we can influence things. We don’t take pictures with a camera, print them at home, and write down the address of the place where we have taken the pictures, and then send them by mail. Instead, everything works through the Internet. There you can see them all as a whole. ... [In the map] you can see a bit clearer that the problems exist not only in a certain area but they recur everywhere.”

Some of the students in the course had already put pictures into the map and all the interviewed students said that they would do it: “Indeed, we have to do it.”

The huge personal effort that the teachers had put into the course did not go unnoticed by the students, who reported the enthusiasm of the teachers as motivating, and that they pushed them forward to accomplish their goals.

4.4 Learning outcomes

The teachers found it difficult to predict what kind of progress to expect as such a process is constantly changing. This is illustrated in the following quote: “We had planned cooperation with the technical bureau concerning their virtual feedback system. It was one of my ideas. And then it was postponed by one year, the whole thing. The project is alive and new things pop up.” Another factor contributing to difficulties in measuring success was that the project is one year long, and in that respect differs from what both students and teachers are used to.

Nevertheless, the teachers believe that the project has had a positive impact on students, at least on the basis of their experience from the first implementation: students’ interest in cycling and in issues related to sustainable development has, in their opinion, increased. The trip to the Netherlands was an eye-opener for both the students and teachers. It also attracted the media’s attention, and in May 2010 a local newspaper, *Länsiväylä*, published a story based on the students’ experiences of the cycling cultures in Finland and the Netherlands.

There is no formal evaluation data of student learning, but in the following we describe learning as experienced by the students interviewed. In general, they defined learning in the course not only in terms of acquisition of contents. Instead, as learning outcomes, they emphasized such factors as critical thinking, perceptual learning, and increased interest and skills in democratic participation. This is illustrated by the following quote:

“Before ... I did not give much thought to cycling. If I bumped into a stone, I might wonder why it was there, but I did not think more deeply about it. Maybe now I think that there is much to improve and much good as well. ... I pay attention to such things as curbs that I have not noticed earlier. ... When you start to cycle more you find out that there is a pattern that recurs.”

5 Impact of On the move!

Key points in Section 5

- ✓ In this report, we examined the *On the move!* project of the town of Kalajoki and the Science Center Heureka.
- ✓ A major outcome of the project is the web service featuring the open learning environment *Link* with the interactive virtual map. The web service also features the *Step-by-step* project model for planning, organizing and conducting a school project in line with the *On the move!* pedagogy.
- ✓ Three learning practices were examined in this report: measuring air quality, *Time-space-paths*, and the *Bicycles on the move!* learning project. In each example, the teachers had succeeded in implementing impressive learning projects, which aroused the interest of the media.
- ✓ Each example highlights *On the move!* pedagogy in practice. That is, the collaborative inquiry of students, promoting students' participation and agency, as well as crossing boundaries and connecting a wide range of school and out-of-school learning settings.

In addition to the Master thesis report of Outi Surma-aho (2010), there is no systematic evaluation data of the project *On the move!* available. At the moment of writing this report, one survey study and several Master theses are being conducted. Furthermore, *On the Move!* is currently being studied by the international research project *Innovative Teaching and Learning* managed internationally by SRI International and Langworthy Research. The following evaluation of the impact is based on the interviews of project manager Heli-Maija Nevala and project coordinator Tiina Hyttinen. We also examine the empirical cases reported above regarding the possible impact of *On the move!* on learning practices in those schools and the students' learning. It is probable that, to some extent, these observations reflect the impact of *On the move!* in the pilot schools more generally.

A major outcome of the project *On the move!* is the web service featuring the open learning environment *Link* with the interactive virtual map. These tools aroused the lively interest of teachers and numerous organizations even before the official publication of the service. The institutions interested in using the virtual environment and collaborating with *On the move!* include large and small NGOs and educational organizations of various educational levels. The interest has been so high that *On the move!* has been forced to limit the nature of organizations that are accepted. A big dilemma has been, for example, whether to accept vocational schools, since their funding comes from the funds reserved for secondary and upper secondary schools.

According to Heli-Maija Nevala, *On the move!* has received a great deal of positive feedback from its users, especially concerning the current version of the interactive map. Moreover, Heli-Maija Nevala lists many successful examples of the impact of *Link* on teaching practices. Nevertheless, initially, while the tools were being developed, they did not always work properly or they were difficult to use. Consequently, technical development has taken much more time on the part of the *On the move!* staff than was originally planned. For example, the interactive map software was replaced after the first year, because of the complexity of the first version. This has taken time away from the development of pedagogies and learning practices, and many potential ideas have remained dormant. Furthermore, Heli-Maija Nevala believes that implementing the technical tools before they were fully developed was the reason behind some of the pilot schools resigning from cooperation, since they may have expected more ready-made solutions from *On*

the move! instead of being part of the developmental work. Heli-Maija Nevala's personal opinion is that it would have been better to involve the pilot schools at a later stage of the project.

Another important impact of the *On the move!* project, according to Heli-Maija Nevala, is the pedagogical development that has taken place in the pilot schools. Some schools have succeeded in revising their pedagogies substantially or launched impressive learning projects that have aroused the interest of the media. In general, these schools have started to use everyday learning settings as part of their pedagogy or combined the perspectives of different school subjects in innovative ways. In addition to those learning projects described in this report, both Heli-Maija Nevala and Tiina Hyttinen mention the Kannus Upper Secondary School experiences of *Geocatching* as a success story. At the Kannus Upper Secondary School, groups of students have designed assignments in biology and hidden these in the forest. With the help of GPS devices, they have recorded the coordinates of the assignments in *Link*. Other students, then, try to find the assignments and solve them. One of the students has documented the activity and a description of the method at the *On the move!* website and reported that both the students and the teacher consider the method a success.

In some schools, however, the impact has been small, and after initial enthusiasm the interest in cooperation with *On the move!* has faded. Moreover, some pilot schools have participated in some meetings but have not managed to do anything of special interest. Heli-Maija Nevala has observed that an important predictor of a successful cooperation with schools has been an already existing interest and the capability of creating new ways to do things. Not much progress has been made in schools where the ideas of *On the move!* have been completely new. Another important predictor of success according to Heli-Maija Nevala is that more than one teacher is interested in developing teaching practices.

As has been reiterated by many school historians, changing teaching and learning practices in school is not easy. These general obstacles probably explain why some schools have had problems in reforming their practices with *On the move!*. *On the move!* together with teachers has analyzed these obstacles, and Heli-Maija Nevala lists some of them. First, teachers are busy dealing with everyday matters and their teaching as usual. Resources are scarce, and there is usually no time for development work, let alone planning with colleagues. In some pilot schools,

the teachers were not even allowed funding for a substitute teacher in order to participate in the meetings and teacher training organized by *On the move!*. Consequently, development often depended on those teachers who were willing to work on the project without being paid. Second, the traditional way of working usually does not entail sharing experiences and teaching ideas with colleagues. According to Heli-Maija Nevala, in many pilot schools the teachers did not even cooperate with other teachers of their own subject. Third, the operating culture of schools was often not in line with the learning projects promoted by *On the move!*. Of special mention is the period system in upper secondary schools, which divides the year into five chunks, each course lasting only one chunk. Moreover, the short duration of lessons may prevent possibilities for field trips. Fourth, especially in upper secondary school, students can be resistant to pedagogical reforms, as they are oriented to the matriculation exams, which are typical paper and pencil tests.

In the *Bicycles on the move!* and Liisa Rantamäki's implementation of the air quality measurement activity, some of these obstacles had been overcome to some extent, although in both settings, the teachers recognized the challenges of project work in the upper secondary school context. Provision of measurement devices made it possible for Liisa Rantamäki to conduct field experiments with students even though the school did not have the resources for proper equipment. The measurement activity in general, and recording of the results into *Link* in particular, helped in overcoming the challenge of fragmentation of time into course chunks; the measurements of one group could be utilized and analyzed by the same group in another course or by another group.

In *Bicycles on the move!* the teachers found it problematic that the course was not "on a code", as they described it. Typically, upper secondary school courses have a so-called course code, that is, courses are placed in the students' study schedule with a certain code. As this project did not have a proper code, it was difficult to find a place and time for the meetings. The obstacle is not easy to solve, since it reflects administrative procedures at the city level, too. Fortunately, the teachers were supported by the headmaster and their colleagues, as all issues related to sustainable development are highly valued at the Etelä-Tapiola Upper Secondary School. Yet, as a consequence of the fragmentation of time, it was difficult to assure student commitment to the

course. This was also confirmed by the students, whose only critique in the interview was the irregularity of the sessions.

The operating culture of the Etelä-Tapiola Upper Secondary School was reflected in the attitudes of the students. Although the teachers were convinced that students had selected the course because they were interested in the theme, and intrigued with experiencing "something different from traditional classroom learning," they were concerned with how to sustain student interest during the project. The teachers reported that the school culture was such that promoted student achievement in tests even though the school had several other ongoing projects besides *Bicycle on the move!*. They pointed out that the students might not be accustomed to the kind of activity that the *Bicycles on the move!* project demanded, such as taking the initiative and the ability to control one's own learning. This is illustrated by the following quote by Mikael Sorri: "... Many students think: 'let's work hard for a ten or nine on our certificates; this project doesn't give me anything.' This project demands a certain enthusiasm, of a different kind than you can find in normal courses."

What was the impact of *On the move!* on the learning practices of the pilot schools in the above cases? Some common patterns can be observed. First, each example could be characterized as collaborative inquiry. The starting point was not a textbook as an authoritative knowledge source, but rather, the students produced their own knowledge, and it was collaboratively examined either virtually or face-to-face. Second, the students were positioned as authoritative and accountable agents capable of reasoning and taking action. This was evidenced by the way dialogues were being conducted, by the informal and open character of the learning environment Link, and by the emphasis given to the knowledge that students had about their everyday setting. Finally, in each example the pedagogy utilized the idea that learning is "happening everywhere all the time." This was indicated by boundary crossing and connections between school and out-of-school contexts.

The findings of this report suggest that the role of the tools such as the interactive map and the air quality measurement devices was fundamental in influencing the reported changes in the learning practices. The new tools substituted textbooks in the learning process and thus, they afforded new kind of learning experiences for the students. For example, in *measuring air quality*,

the students learned to participate in simulated expert practices of conducting the measurements and reporting the results. This involved dealing with surprising practical disturbances and dilemmas characteristic of experts' work. The use of virtual tools in turn incorporated students' out-of-school experiences into classroom assignments transforming the contents of learning. The virtual tools also changed the status of the learning products; the learning products were now designed to convince outside audiences in addition to the teacher. In short, the transformed learning practices influenced the very nature of what was learned. The new kind of learning was naturally interwoven in the learning practices, and contributed to promoting important learning outcomes understood as 21st century competences.

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