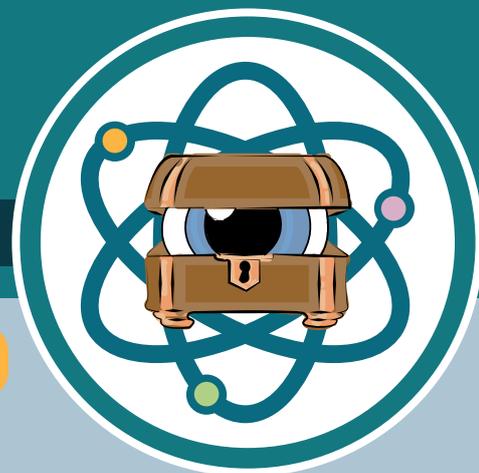


# Ark of Inquiry

newsletter

3/2016

issued by the Ark of Inquiry project consortium



## Welcome, dear Subscriber!

This is the seventh official newsletter of the Ark of Inquiry project. We are thankful for your interest in the project. In the newsletter you will find information about the latest news and upcoming events.

We hope that you have had a wonderful summer and are ready to begin the new schoolyear.

As you may already know, Ark of Inquiry is a teacher training project which aims to train at least 1100 pre- and in-service teachers in inquiry learning and raise their awareness of Responsible Research and Innovation (RRI). In some partner countries, the first teacher trainings have already taken place, but in most countries, the partners have spent the summer months making plans and last minute preparations for the upcoming autumn training sessions. The trainings will take place in 12 European countries: Estonia, Finland, Hungary, Germany, Italy, Greece, Cyprus, Turkey, Belgium, the Netherlands, France and Austria. All interested teachers are more than welcome to participate in the trainings. You will be able to learn more about inquiry learning, RRI, the Ark of Inquiry portal and find out how to support pupils in their inquiry activities. If you are interested in finding the nearest training session, contact us via [arkofinquiry@gmail.com](mailto:arkofinquiry@gmail.com) and we will put you in touch with the local coordinator!

In this issue of the newsletter, you can read about the first impressions from the teacher training sessions held in Greece and Hungary and find out more about the upcoming training sessions in Italy. In this issue, we are back with the "Teacher feature", which you might remember from last year. You will also find a short article on how to engage girls more in science classes. As always, we will also introduce some of the inquiry activities that can be found in the Ark of Inquiry platform that help to implement inquiry and RRI in your classroom. You will learn what has happened in the past couple of months and find out which events are worth looking forward to in the upcoming months.

On behalf of the Ark of Inquiry team, we wish you a colourful autumn and a fruitful new schoolyear. We hope to see you at our trainings!

## Ark of Inquiry teacher training is about to start!

Are you a teacher? A science educator? Do you want to know more about inquiry learning and engage in hands-on science activities? Do you want your pupils to have fun while learning science? Take part in your nearest Ark of Inquiry training! To find out more, contact us via [arkofinquiry@gmail.com](mailto:arkofinquiry@gmail.com)!

## Upcoming events

An Ark of Inquiry information day for museums and science centres will be held in November 2017 at AHHA Science Centre in Tartu, Estonia.

During the meeting the participants will find out more about the project and about the different possibilities to participate in the project. Keep an eye on our Facebook page to find out more about the event and how to register!

More upcoming events on our website!

## About the project:

### Project Title:

Ark of Inquiry: Inquiry Awards for Youth over Europe (FP7, No. 612251)

### Funding Scheme:

EU-FP7-SCIENCE-IN-SOCIETY-2013-1 (CSA-SA)

### Duration:

4 years (March 2014-Feb 2018)

**Consortium:** 13 partners coordinated by Tartu Ülikool (University of Tartu), Estonia; Ellinogermaniki Agogi Scholi Panagea Savva AE, Greece; Turun Yliopisto (University of Turku), Finland; Panepistemio Kyprou (University of Cyprus), Cyprus; UNESCO Regional Bureau for Science and Culture in Europe, Venice, Italy; Hogeschool van Arnhem en Nijmegen (HAN University), The Netherlands; Bundesministerium für Bildung (Ministry of Education), Austria; Humboldt-Universität zu Berlin (Humbolt University), Germany; Bahcesehir Egitim Kurumları Anonim Şirketi (BEKAS), Turkey; Ecole de l'ADN (DNA Learning Centre), France; University Colleges Leuven-Limburg (previously KHLim), Belgium; Kutató Tanárok Országos Szövetsége (Hungarian Research Teachers' Association), Hungary; SA Teaduskeskus AHHA (AHHA Science Centre), Estonia

European Union's  
Seventh Framework Programme



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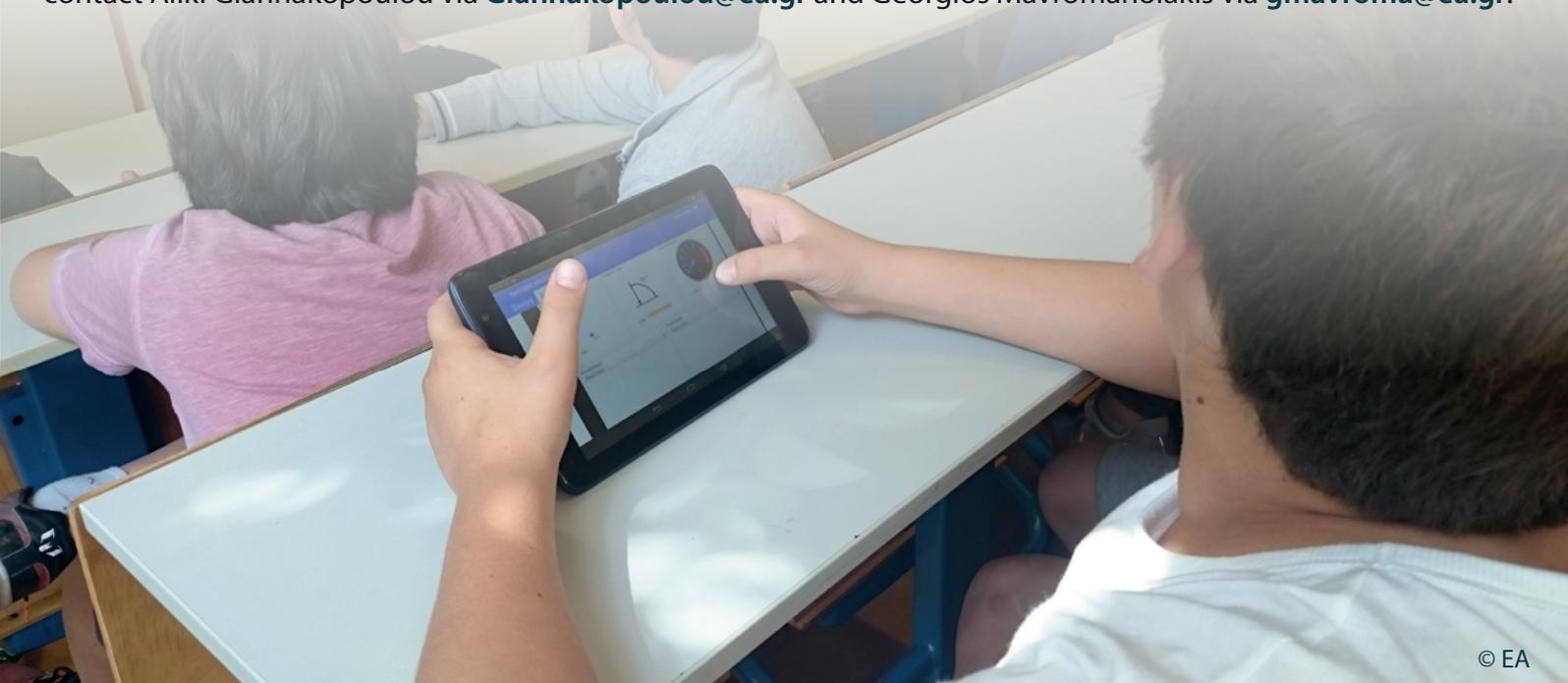
## News from the field

### First impressions from the Ark of Inquiry teacher training in Greece

On 23 June, on the premises of Ellinogermaniki Agogi in Greece, teachers from primary and secondary schools from different parts of the country came together for one of the Ark of Inquiry teacher training seminars. During the seminar teachers got acquainted with the term Responsible Research and Innovation (RRI), were introduced to the Ark of Inquiry platform and discussed how they plan to implement inquiry activities in their own schools.

One of the teachers attending, Mr. Emmanouil Kanakis from the 7th Primary School of Argyroupolis said about the seminar: "I attended the introductory seminar of Ark of Inquiry. I had also attended several of the past science related project meetings, yet Ark was the first one fully dedicated to science teaching. The project looks promising as it offers a great opportunity to integrate science, IT and pedagogy. It also offers a composite and user-friendly environment for the exchange of ideas between teachers and different European education systems. I am looking forward to the upcoming seminars."

This was only the first seminar, followed by a series of additional teacher trainings that will be organized in Greece at Ellinogermaniki Agogi as part of the Ark of Inquiry project. Seminars on RRI for the school community are not common in Greece and many teachers have expressed their interest in finding out how they could use the RRI principles in their everyday school life. If you want to find out more about the seminars organized in Greece, please contact Aliko Giannakopoulou via [Giannakopoulou@ea.gr](mailto:Giannakopoulou@ea.gr) and Georgios Mavromanolakis via [gmavroma@ea.gr](mailto:gmavroma@ea.gr).



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The Ark of Inquiry project aims to raise youth awareness to Responsible Research and Innovation (RRI) and to build a society skilled in RRI and related scientific communication. It will provide young European citizens (7 to 18 year olds) with a pool of activities to improve their inquiry skills, increase their awareness and understanding of conducting 'real' science, and prepare them to participate in different roles in the European research and innovation process.

To this aim the project will:

- develop a framework for identifying inquiry activities that promote pupils' awareness of RRI;
- collect existing inquiry activities and environments from various national and international projects;
- make activities available across Europe through the Ark of Inquiry platform (implement the inquiry activities on a large-scale across a European school network such as the UNESCO Associated Schools Programme Network (ASPnet) so to bring together learners, and supporters (teachers, science and teacher education students, and staff of universities and science centres). During the project it is expected that at least 20 000 students will participate in the Ark of Inquiry.
- train at least 1,000 teachers to support pupils' inquiry activities in a manner that attracts pupils' interest and motivation towards RRI.

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### More than 70 teachers have already participated in the Ark of Inquiry project in Hungary

HRTA is delighted that more than 70 teachers have already come to know the Ark of Inquiry project in Hungary. On 24 August 2016, the 3rd teacher training session was organized in Hungary, at the József Eötvös Grammar School, which is one of the most famous science-oriented secondary grammar schools in Hungary. Participants, especially in-service teachers and teacher educators, got to know the project website and the platform as well as the aims and the methods of the project.

Participants believe that inquiry-based learning (IBL) and Responsible Research and Innovation (RRI) can increase pupils' interest in natural sciences. IBL activities in the Ark of Inquiry platform would be useful for them to improve their everyday teaching practice. These activities show that science could not only be interesting but also fun for younger and older pupils alike. Hungarian teachers believe that the most exciting thing in the Ark of Inquiry project is being a member of a Europe-wide community where people have the same opinion about renewing science education.

One of the teachers attending, Mr. Zoltan Kerényi, a biology teacher at Premontrei Grammar School in Gödöllő, said: *"The first thing that caught me in this project was the name: Ark of Inquiry. We can translate these polysemantic words in different ways and it helps us to understand the essence of this multicolour project. It is similar to the effect when the prism resolves the sunlight into its own colours. I was also convinced that the activity we did in the teacher training was very useful for me. It was easy, did not require much material consumption and was rather interesting to raise the awareness of the pupils. I am sure that with IBL we can motivate our pupils and during the activity they can acquire diversified theoretical and practical knowledge as well."*

Mrs. Katalin Holzgethán, a biology and chemistry teacher at Ferenc Liszt Music Grammar School in Budapest, had this to say: *"With the help of the Ark of Inquiry project teachers could plan their lessons easily and thus their lessons could become more interesting and innovative. During the teacher training I could do and try the activities in several roles, e.g., as a teacher or as a pupil. In this way I could put myself in a pupil's shoes in the lessons. Besides the practical knowledge I come to know lots of information and theoretical background about IBL and RRI as well. It seems that in the Ark platform the possibilities are endless."*



*The possibilities are endless in the Ark - Mr. Zoltán Kerényi (on the left side), © HRTA*

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### Ark of Inquiry was introduced in Pakistan

The Pakistan Science Foundation organized an International Workshop on Inquiry-Based Science Education in Islamabad, Pakistan on 5–7 September 2016. During IBSE activities and project sessions, BEKAS presented the Ark of Inquiry project as an example of an IBSE project funded by the European Commission, 7th Framework Programme.



### Ark of Inquiry team from Estonia and Finland shared learning day in Heureka Science Centre

UT, UTU and AHHAAs collaborated to bring about a unique experience for the Estonian pilot teachers and to spark collaboration between AHHAAs, Heureka and UTU through a mutual learning day that was held at **Heureka Science Centre** on 30 May 2016. Liina Vaher, Head of Educational Programs at Science Centre AHHAAs, Estonia, wanted to share some impressions with you.

"Oooh," is heard in the laboratory when explainer Elina puts natural lungs on the table. Some of the boldest touch the lungs with their finger. The AHHAAs educational team have presented the magnet of the Study Human Anatomy Program to the visitors of the Heureka Science Centre.

The main goal of this visit was to set up a discussion about cooperation opportunities as well as to introduce inquiry-based learning methods and the Ark of Inquiry project activities in Finland.

The first scheduled experience, lung and heart dissection is on the table and the workshop has begun. Heureka's regular guests are peeking at the organs, but Elina encourages them to explore them closer.

An empty lung feels like a sponge and is very light when you lift it. Functioning human or animal (pig) lungs are filled with blood, and they work continuously to transfer oxygen into the blood and carbon dioxide out of the body. Now it is time to investigate how the lung fills with air. Elina demonstrates how to use drinking straws to blow into the pig's lung so that the lung visibly swells. Participants' eyes light up, and the initial hesitation disappears as soon as the air has filled the lungs.

"Very informative and engaging," said the pupils and the teacher who attended the workshop. "A bit nasty as well," one of the boys added, referring to the special smell.

In the second half of the workshop the human body is tested from an entirely different angle – our genetic material DNA is placed under the microscope. The participants of the workshop are different now: this time AHHAAs educational team, partners from the University of Tartu and the University of Turku and hosts from Heureka are sitting at the table. AHHAAs Coordinator of Educational Programs, Pille, points to the novel Investigating Roadmap. This is actually the first time to introduce the methodology that AHHAAs has been developing to contribute to the Ark of Inquiry platform.

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What is the novelty of the workshop? Liina Vaher, explains that the Investigation Roadmap uses the same methodology of inquiry as in real labs, where the results of tests are not always so clear. The methodology allows you to explore more options than just one test. The process of inquiry can be followed with the help of the roadmap and all important steps are recorded there. This way groups of pupils can work independently and the teacher's role is to counsel the teams. In this workshop the pupils start with posing hypotheses and then plan the tests, complete them, analyse the results and compare them with their hypotheses. An important role has been attributed to discussion and lessons learned. Completing tests is not a goal in itself – it is important to know the results placed in a broader context.

As said before, the focus of this workshop is DNA. Do we have it in humans and other living organisms? But can it also be found in the soil? We'll investigate! Although all the participants of this workshop have passed the school biology programme and some of them have studied natural sciences in university, this is not affecting their enthusiasm for extracting DNA from their saliva samples as well as from fruits, sand and soil. "We've seen it on the CSI!" announces one investigator.

The joy of your own successful test is immense – but a successful test does not mean that the hypothesis is confirmed.

Such methods can also be used, for example, to study how to develop false positive results. The roadmap gives pupils greater responsibility for solving a problem, being "teacher-friendly" at the same time, as it does not require additional resources for preparation.

"We are trying to show that there is not always a correct answer, or you have more than one," states Pille.

In this way, the methodology is in line with exploratory learning, as well as RRI – the principles of Responsible Research and Innovation. It should help learners to think critically and use all the collective knowledge they have to interpret the results.



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At the same time, Estonian teachers explore Heureka's treasures. This group of teachers participated in the piloting phase of the Ark of Inquiry platform and tools and participated in the project activities during the past year. Their role is to gain experience from several science centres and act as consultants as to how science centres and museums can be part of the Ark of Inquiry community.

Liina Tamm, head of Konguta School from Tartu county, commented on the study trip: "It was very positive, because such an experience is useful for both, the learner and teacher. It also enriches your knowledge and expands your perspective. It was very nice to see that Heureka and AHHA are not competing in the field of popularizing science, but both seek a scientific way of thinking and provide practical experience for schools."

"I can see that my teachers dare to experiment and not be afraid of making mistakes. Learning together is very useful to support each other and feel encouraged. My wish is to make sure that pupils are able to see the cause-consequence relationships and understand how the world works. I like how both teachers and children are experimenting. I like the creation of discovery and pleasure! I'd like to get my pupils to think "outside the box" and I like it when the teacher is there collecting, where appropriate, ideas and inspiration from the Ark of Inquiry platform. It would be nice if we could teach kids the skills of scientific reading and writing. I can see that science centres and museums can offer schools practical/laboratory support and act as guides to science."

Elin, 2nd grade teacher: "My experiences were only positive in Heureka. A truly interactive science centre where pupils get new and exciting experiences. Piloting Ark of Inquiry gave me confidence, courage and support for a variety of mini-studies, experiments and tests to be carried out more boldly. This kind of support better prepares learners for further activities on the next school levels."

The final part of the day took place at lunch, where experiences, ideas and future plans were shared. And what is most important – science centres and museums welcome researchers, teacher trainers and will gladly host events for teachers, as this enables teachers to be better partners to pupils and offer exactly those programs that are needed to support inquiry skills in a superb technological and interactive environment.

## The Ark of Inquiry teacher training plan in Italy

The Ark of Inquiry teacher training model and schedule for Italy developed by the UNESCO Regional Bureau for Science and Culture in Europe, our project partner based in Venice, is significantly different from the "one-size-fits-all" kind of professional development courses which are known to have very limited effectiveness. This particular training programme is tailor-made to fit the objectives and needs of the project and to assist in achieving its desired results.

In order to conduct these trainings, UNESCO has entered into a strategic cooperation with the National Association of Natural Science Teachers ANISN (Associazione Nazionale Insegnanti di Scienze Naturali), which is a qualified entity for training teachers by the Italian Ministry of Education, University and Research (MIUR). ANISN has helped the project in various ways to reach the science teachers community, select the training venues, and its involvement in the trainings will give an additional incentive to the teachers to participate in the form of accreditation and certificates recognized by the Ministry.

## Upcoming events

**The Ark of Inquiry project will be presented at the 5th World Conference on Science and Technology, which is organized by ICASE (International Council of Associations for Science Education).**

It is scheduled for the Titanic Beach Resort Hotel, Antalya, Turkey from 1–5 November 2016. The theme of the conference is "Interdisciplinary Practices in Science and Technology Education".

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The training programme will focus on enhancing the capacities and professional development of the participants to become progressively expert in Inquiry-Based Science Education (IBSE) and the usage of inquiry activities, with the support of local and national networks of peers and experts. This will be achieved by:

- Adapting the training model and resources to the Italian and local context. The training modules and materials have been translated into Italian and combined in separate booklets for the 3 phases (teachers as learners, thinkers and reflective practitioners). This is done for ease of understanding and accessibility to the teachers.
- Adopting a pragmatic approach and creating a multilevel system to support the development process of the teachers involved in the project.
- Creating a local Ark of Inquiry nucleus in 3 Italian regions which will act as reference centres/ communities of practice, and will be a starting point for further dissemination processes.
- Establishing a network of Ark of Inquiry reference school teachers and coaching teachers by involving teachers with both basic and expert knowledge of IBSE.
- Sustaining a dynamic system that capitalizes on the feedback and the results of the training project in order to improve and develop the successive training courses.

These objectives have been formulated based on the results and recommendations of the project's pilot phase in Italy, taking into consideration the different backgrounds of the teachers and their different expertise in the inquiry-based teaching approach.

Training sessions are planned in 3 different cities in Italy: Naples, Rosà and Foligno.

The hosting institutions for the training programmes include a research centre in Naples, a well-equipped school in Rosà and a science centre laboratory in Foligno. Their involvement might also lead to the desired involvement of science centres, museums and schools in the Ark of Inquiry project, which is one of the overarching aims of the project.

It is worth mentioning that the training courses will be designed and structured differently according to the various regions targeted in this training program. This is due to the differences in the backgrounds of the teachers and their expertise in inquiry-based teaching approach.

In Naples, the teachers will be divided into two groups based on their expertise in IBSE. For the first group with basic expertise in inquiry-based approach, the Phase A and C (teachers as learners and reflective practitioners) training will involve an online medium, the training session in presence will be on Phase B (teachers as thinkers). For the second group with advanced expertise in IBSE, the training session will focus on a group discussion about resources, the different phases of trainings, context specific teaching methods and comparison with previous experiences in order to improve IBSE. These teachers will also be multipliers of inquiry-based science education in future.

In Rosà and Foligno, the training courses will be on Phases A and B during the trainings in presence and training for Phase C will be using the online means.



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### Teacher feature



In this issue, we are back with the teacher feature! We asked teachers from Turkey and Italy to share with us their experiences and thoughts about Ark of Inquiry. This is what one teacher from Turkey, Elif Yavas, had to say about the project.

#### What does Ark of Inquiry mean to you?

It represents an alternative approach to learning and therefore to teaching. Not only science but many other subjects as well. It all begins with a valid and inspiring question. A problem which the pupil can own and relate to and therefore actively try to solve, and gain new knowledge along the way. It is obvious that the classical methods, although concrete in many ways, do not necessarily lead the pupils to the finishing line as winners: there is an obvious gap between being knowledgeable about something and being able to design a product with that knowledge. I believe inquiry approach may be the missing ingredient and the Ark of Inquiry project will be the answer to this requisite.

#### What are your impressions based on the experiences so far?

When I read the aim of the project, the scope and the workflow, I was impressed with the magnitude of contributions and the number of people that would become experienced in inquiry-based science education as a result of these studies.

#### What have you learned during the experience/event/workshop?

I had experience in inquiry-based science education previously, so I mostly enjoyed watching new teachers getting acquainted with it. I like to see the negative first impressions about the applicability of the method to turn into laughter and fun and a new belief in an alternate way to teach science which reaches pupils at a whole new level.

#### Share a funny or a success story about Ark of Inquiry

It is very surprising and exciting for me to see grown-ups (teachers, educators) become competitive and insistent during the workshops when it is time to talk about their own product or ideas, just like the younger pupils do in the classroom. One time, we were asked to design a vacuum cleaner out of recycled materials and I must admit we really had a nice time doing it, but at the crescendo where the best design was to be decided, the runners-up changed their approach completely and took it very seriously to show that their work was better, which was very funny, as it was a complete turn from 5 minutes ago where they were all laughing and joking. I think this basic human psychology is a driving force, all we need to do is to focus this energy in the right direction for better results.



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© Kristina Kravets from AHHA



### How to empower girls in science

**There is ample research which shows that prevailing stereotypes can demotivate girls from learning and participating in science classes. Therefore, the Ark of Inquiry project consortium worked together to develop a pedagogical scenario “Empowering Girls in Science” (Scenario 3 in Deliverable D2.2) which focusses on including girls more in the science classroom.**

Based on the feedback collected from teachers during the pilot phase of the project we have elaborated on the initial pedagogical scenario and developed more concrete examples of how to engage both boys and girls more effectively in the classroom.

The result is a simple infographic that includes simple strategies, online resources and examples for teachers on how to include girls in science, and a document which supports it in further detail.

These resources were initially created in English with the contribution of various consortium partners and were also translated into Italian for use by UNESCO during the upcoming teacher trainings in Italy. The infographic has also been translated into Estonian by UT. Various additional consortium partners have expressed interest in translating these resources and using them in their teacher trainings. Thus far, Ecole de l'ADN has proposed to translate them into French, and Hogeschool van Arnhem en Nijmegen (HAN) in the Netherlands has proposed to use them in their teacher trainings. We welcome you to use these documents to ensure all learners are inspired to engage with inquiry- based science!

You can click [here](#) for access to the infographic (.pdf, .pptx, .png) and the document (.docx).

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### Inquiry activities: Activities that engage all learners

As many of you may have noticed, the Ark of Inquiry portal is now available for everyone at [arkportal.eu](http://arkportal.eu). The portal features an ever-growing collection of inquiry activities in different languages and in different domains. In our previous newsletters, we have brought to you a selection of inquiry activities with a strong RRI focus or those suggested by our pilot teachers. In this issue, we present to you a selection of activities from the portal that help to engage all learners with inquiry-based science.

#### A healthy pizza

The main goal of the mission is to help pupils learn about the various nutrients and the nutritional value of prepared food, using pizza as an example. At the end of the mission learners should propose a healthier pizza recipe. Through the activities learners get to know about unhealthy food, nutrients, nutritional value, the food pyramid, nutritional needs, basic energy requirements (BER) and the digestive system. The skills gained are related to the inquiry skills (identify problem, formulate hypotheses, plan-design-perform experiments, analyse-interpret data, communicate the results, reflect on the process followed).

#### How do people travel when they go on holiday?

In this activity pupils think about the impact of different kinds of transportation on the environment. The activity raises pupils' awareness of the impact of their travelling on the environment and gives rise to discussions about mobility issues in society, benefits and drawbacks of different forms of transportation, and possible (technological and social) solutions.



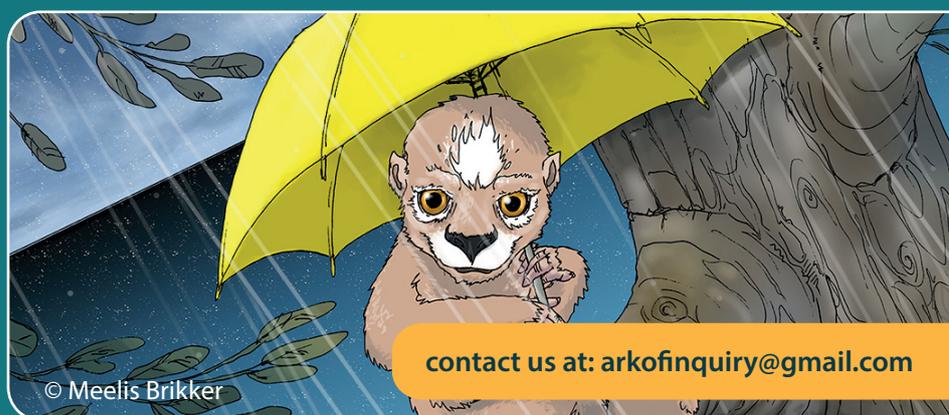
#### Ants!

What do we know about ants? In this activity pupils can observe real ants in the schoolyard and try to find answers to questions they might have about their life. The children create a class poster about ants and their characteristics or make individual drawings. For questions that have not been answered by observation, pupils are given the opportunity to discuss how to answer them and to conduct experiments regarding, for example, what ants eat. Finally, the children compare their predictions with their actual observations.

### In the next newsletter:

- Find out more about the Ark of Inquiry platform and activities inhabiting it;
- see what was done in Ark of Inquiry during the autumn months;
- and find out what events are worth looking forward to in winter

Dear Subscriber, we wish you all the best and hope to see you again soon!



contact us at: [arkofinquiry@gmail.com](mailto:arkofinquiry@gmail.com)