

## The European INSTEM Network

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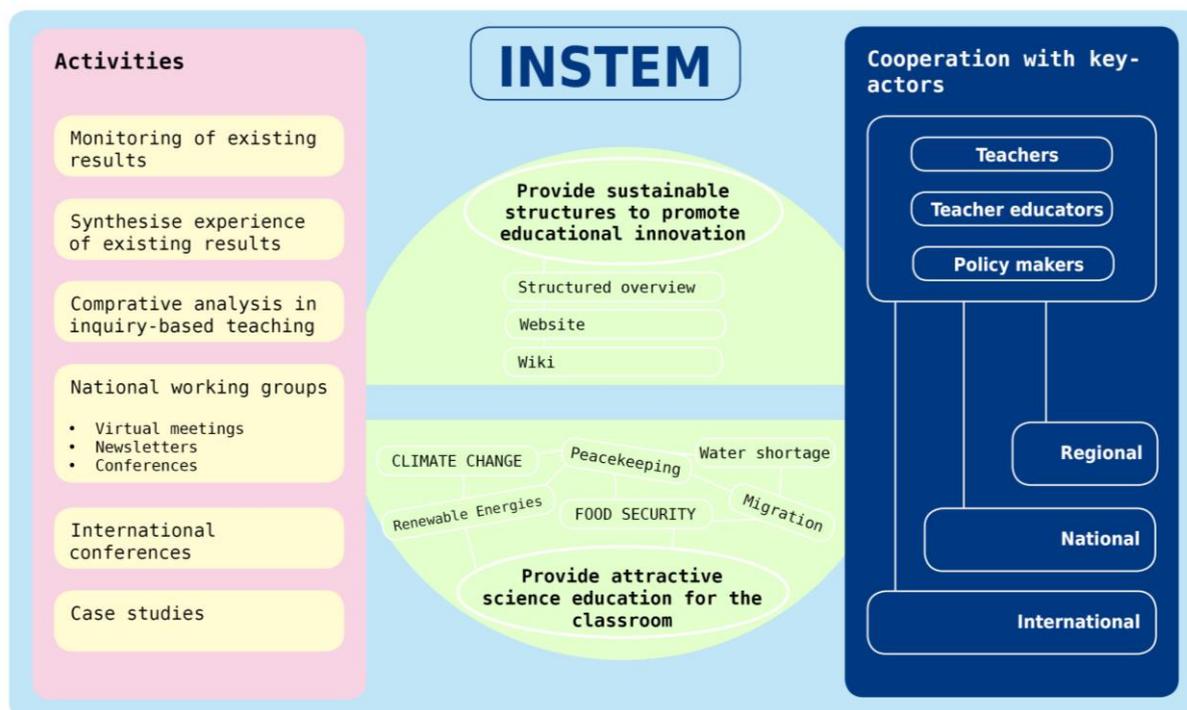
### Abstract

*INSTEM is a Comenius network (2012 – 2015), which brings together the experience and learning of a wide range of projects in European Science and Mathematics education and links research, practice and policy in a unique way. Its main goal is to promote inquiry based teaching, to gather innovative teaching methods and to raise students' interest in science as well as offering them careers information in STEM subjects, in order to respond to global challenges in teaching and gender imbalances in STEM education. The INSTEM project was developed from the idea that projects in STEM education should talk to each other and share their ideas. It grew out of the informal group ProCoNet (Project Coordinators' Network), which was formed in 2011. INSTEM and ProCoNet work closely together and provide a single channel to communicate with European Union directorates and other policymaking organisations. INSTEM also acts as an integrated provider of STEM education materials and techniques, based on the work of previous projects. It works with national teams on the implementation of good science and mathematics teaching, using inquiry as a starting point whilst being open to all innovative and effective approaches. INSTEM has developed two reports already. These are accessible on the project website: <http://instem.tibs.at/node/24>. The INSTEM State of the Art Report is based on an analysis of EC funded inquiry-based learning (IBSE) educational innovation and provides insight into inquiry based teaching in Europe, gender issues, science career information and on the exploitation of project knowledge beyond the lifetime of projects. The INSTEM Synthesis Report is based on a review of documents supplied by 20+ of the STEM (Science, Technology, Engineering & Mathematics) education projects funded in FP7 and the LLP. Two international conferences and a series of national workshop have been hosted by partner institutions in various partners countries. These events aim for bringing together various stakeholders in education such as researchers, practitioners and policy makers and to discuss lessons learned from EU funded Science and Mathematics Education initiatives. Strategies for how to implement this knowledge into the national educational system most successfully should be developed. Summaries about these events are also available on the project website (see above).*

### 1. The Project

INSTEM is a Comenius network (2012 – 2015), which brings together the experience and learning of a wide range of projects in European Science and Mathematics education and links research, practice and policy in a unique way. Its main goal is to promote inquiry based teaching, to gather innovative teaching methods and to raise students' interest in science as well as offering them careers information in STEM subjects, in order to respond to global challenges in teaching and gender imbalances in STEM education. The INSTEM project was developed from the idea that projects in STEM education should talk to each other and share their ideas. It grew out of the informal group ProCoNet (Project Coordinators' Network), which was formed in 2011. INSTEM and ProCoNet work closely together and provide a single channel to communicate with European Union directorates and other policymaking organisations. INSTEM also acts as an integrated provider of STEM education materials and techniques, based on the work of previous projects. It works with national teams on the implementation of good science and mathematics teaching, using inquiry as a starting point whilst being open to all innovative and effective approaches.

INSTEM has developed the following two reports already. These are accessible on the project website: [www.instem.tibs.at](http://www.instem.tibs.at).



*Fig.1. The INSTEM project design: INSTEM activities are used to support the development of sustainable structures to promote educational innovation and attractive science education for the classroom. This is done in cooperation with key actors on the region, national and international level.*

As can be seen in Fig.1, global challenges, such as global and climate change, food security or migration call for innovative solutions. To meet these challenges, students must understand fundamental concepts of science and must be able to use them. Enquiry-based teaching can make science education more attractive. The implementation of these educational innovations requires collaboration with key-actors such as teachers, teacher educators and policy makers, namely on different levels. But such actors need sustained long-term structures. Hence INSTEM will synthesise the extensive knowledge and experience from many EC funded projects, and make this material accessible and relevant through innovative dissemination methods and sustainable national working groups to transform science teaching.

## 2. INSTEM State of the Art Report

A state of the art report based on an analysis of EC funded inquiry-based learning (IBSE) educational innovation including inquiry-based teaching, gender issues, science career information and on the exploitation of project knowledge beyond the lifetime of projects across the partnership nations.

### Executive Summary

Our work demonstrated that a great deal has been achieved to support teachers to develop inquiry-based learning pedagogies throughout Europe. Various resources and support measures such as teaching materials, professional development courses for teachers or support for professional development facilitators - just to mention a few - were developed and made available. However a number of key aspects still remain unresolved. Consequently recommendations were derived from our findings; These are based on the Specific projects reviewed but also have wider applicability.

[http://instem.tibs.at/sites/instem.tibs.at/files/upload/State%20of%20the%20Art%20Report\\_0.pdf](http://instem.tibs.at/sites/instem.tibs.at/files/upload/State%20of%20the%20Art%20Report_0.pdf)

## 3. Structured Summarising Report about Project Knowledge

This report is based on a review of documents supplied by 20+ of the STEM (Science, Technology, Engineering & Mathematics) education projects funded in FP7 and the LLP. The review is as comprehensive as possible but cannot be exhaustive, due to the continual proliferation of projects and documents. Its conclusions are set out below.

It is necessary to adopt a critical approach to project documentation because projects operate under constraints of language, presentation and timeframe relating to European Commission requirements. They conform to the requirements of calls for proposals and the resulting “descriptions of work” or “technical annexes” for specific projects. Thus, reports do not always convey the day- to- day reality of how projects operate.

The INSTEM synthesis, however, reflects the consensus view of a significant percentage of project coordinators, who have all had experience of STEM projects over many years and who are all committed to improving the state of STEM education in Europe and elsewhere.

The companion state of the art report from INSTEM reports in more detail on the views of coordinators and other project partners. Both reports, however, convey essentially the same messages regarding the need for a coherent approach to STEM education in Europe. The funding of STEM education projects by the EC is an important contribution to revitalising teaching and learning in these subjects, and all the projects reviewed here are fully committed to a pan-European movement towards innovative policies in STEM education. As this report will show, however, innovative policies do not necessarily equate to the use of any specific methods, and the promotion of inquiry-based learning should be seen in the context of other enhancements to practice, such as the increased use of formative assessment, or more attention to diversity issues including gender.

<http://instem.tibs.at/sites/instem.tibs.at/files/upload/INSTEM-Synthesis%20Report.pdf>

## **4. Future Perspectives**

### **4.1. INSTEM Case Studies**

INSTEM will publish a series of Case Studies on its website by the end of 2015. Each case study is authored by an INSTEM consortium partner and will tell the story about how the particular project was designed and implemented.

### **4.2. Comparative Analysis of Inquiry Teaching**

In addition the Comparative Analysis of Inquiry Teaching Report will be published by the end of the project.

This report will be based on the work in the national groups and will inform on the current state of the art of educational innovation in the partner regions. It will also present comparative case studies on methods for exploiting project results as suggested by the different countries.

### **4.3. Final INSTEM Conference**

The final INSTEM Conference will be held in Frankfurt. As is generally known, global challenges, such as global and climate change, food security or migration call for innovative solutions. To meet these challenges, students must understand fundamental concepts of science and must be able to use them. But what attracts students to learn? Moreover, how can educational innovation be implemented? Hence, the conference will focus on the dissemination of innovative pedagogies.



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