



The  
**Fibonacci**  
Project

DISSEMINATING INQUIRY-BASED SCIENCE  
AND MATHEMATICS EDUCATION IN EUROPE

# FIBONACCI EUROPEAN TRAINING SESSIONS

DEDICATED TO INQUIRY-BASED SCIENCE AND  
MATHEMATICS EDUCATION (IBSME)

TRAINING CATALOG: COURSES, CALENDAR, REGISTRATION

SEPTEMBER 2011 - MARCH 2012



# What is the Fibonacci Project ?



The ambition of the Fibonacci project is to contribute to the dissemination of Inquiry-Based Science and Mathematics Education (IBSME) throughout the European Union, in a way that fits with national or local specificities.

This project defines a dissemination process from 12 Reference Centres to 24 Twin Centres based on quality and a global approach. This is done through the pairing of the Reference Centres selected for their large school-coverage and capacities for transfer of IBSME with 12 Twin Centres 1 and 12 Twin Centres 2, considered as Reference Centres-in-progress.

A scientific committee of acknowledged experts in science and mathematics education supervises the work. An external evaluation is also included to check the achievement and impact of the project.

The Fibonacci project will lead to the blueprint of a transfer methodology valid for further Reference Centres building in Europe.

The project, started on January 1, 2010 for a duration of 3 years, is coordinated by the French *La main à la pâte* programme (*Académie des sciences, Institut National de Recherche Pédagogique, École normale supérieure* – the latter being the legal entity in charge of Fibonacci), with a shared scientific coordination with Bayreuth University (Germany).

The Consortium includes 25 members from 21 countries with endorsement from major scientific institutions such as Academies of Sciences. It will be subsidized up to 4.78 million euros by the European Commission 7<sup>th</sup> Framework Programme.



Fibonacci has received endorsement or manifestation of interest from the following prestigious scientific bodies:

The Academy of Athens • The Berlin-Brandenburg Academy of Sciences • The Bulgarian Academy of Sciences • The Finnish Academies of Sciences and Letters • The French Academy of Sciences • The Romanian Academy • The Royal Society (UK) • The Royal Irish Academy • The Royal Netherlands Academy of Arts and Sciences • The Royal Swedish Academy of Sciences • The Serbian Academy of Sciences and Arts • The European Science Education Research Association (ESERA) • The European Space Agency (ESA) • The International Research Group on Physics Teaching (GIREP) • The InterAcademy Panel on International Issues (IAP)

# Introduction

The Fibonacci project (2010-2013) is based on 3 pillars:

1. **An inquiry-based approach** to science and mathematics (IBSM) teaching and learning in primary and secondary schools;
2. **A local approach**, mobilising a comprehensive and complementary group of local partners.
3. **A twinning strategy** linking 37 centres in 24 countries. From 2010 to 2012, 12 Reference Centres with a high expertise in IBSME are twinned with 12 intermediate centres and 13 beginner centres. In 2012, 24 new partners (not identified yet) will join the Fibonacci project, expanding it to almost all European countries.

In the frame of this project and as the result of the work and exchanges between the Fibonacci partners, **5 European training sessions (TS) are organised from September 2011 to March 2012** on the following topics:

Topic of the training session	Dates	Venue
TS1: Integrating inquiry across curricula	<i>Monday 12th – Thursday 15th September 2011</i>	Leicester, United Kingdom
TS2: Using the external environment of the school	<i>Monday 10th – Wednesday 12th of October 2011</i>	Helsinki, Finland
TS3: Implementing and expanding a Reference Centre	<i>Monday 28th - Wednesday 30th of November 2011</i>	Berlin, Germany
TS4: Deepening the specificities of inquiry in mathematics	<i>Wednesday 15th – Friday 17th February 2012</i>	Bayreuth, Germany
TS5: Deepening the specificities of inquiry in natural sciences	<i>Wednesday, March 21st Friday, March 23rd, 2012</i>	Paris, France

These training sessions have been conceived taking into account the expertise of all Fibonacci centres and they cover all key aspects of IBSME. They will enable participants to exchange expertise on the topics and to converge towards common approaches and methodologies.





## **Public**

Each session is planned over 3 days, for sixty (60) participants **from all EU countries**. The target group is mainly **science and mathematics educators and teacher trainers, project coordinators**, etc. A special attention will be paid to the persons with the capacity to **implement and disseminate IBSME** in their respective countries or abroad. Participants can be internal or external to the Fibonacci project. All sessions will be **delivered in English**. Participants must therefore be proficient in this language.

This catalogue contains the description of each course and the main information on the venue, contents, registration modalities and contacts. The costs of stay and transport will have to be covered by each participant. No fee will be requested for registration.

The full programme will be made available on the Fibonacci website – [www.fibonacci-project.eu](http://www.fibonacci-project.eu) (*project section*)

► Contact for general information:

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ENS / La main à la pâte  
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Address: 1 rue Maurice Arnoux, 92120 Montrouge, France

► For details on each European training session, please contact the person in charge in the organising centre (cf. next pages).



# TS1: Integrating inquiry across curricula

## Dates

Monday 12th (2.00 p.m) –Thursday 15th September 2011 (1.00 p.m).

## Venue of the training session

The Seminar will be held at the **University of Leicester** Halls of Residence John Foster Hall which has en suite single bedrooms and an adjacent Conference Suite which includes a reception area, hospitality bar, dining room and 6 multi-functional meeting rooms. It is located 2½ miles from the city centre in an attractive area of Leicester. There is good bus access to the centre and railway station. Details can be found at [http://www.le.ac.uk/conferences/acc\\_jfh.html](http://www.le.ac.uk/conferences/acc_jfh.html)

## Contents

*Aim:* to explore how to make effective links between science and different school curriculum areas in order to support learning in each subject, without losing the development of quality inquiry methods.

Educationalists involved in primary education usually think of making links between science and other subjects such as mathematics and language. However educationalists involved in secondary education tend to focus on making links between physics, chemistry and biology. These different approaches will be reflected in sessions during the Seminar.

A progression can be identified to help teachers to integrate inquiry across the curriculum effectively. Initially teachers and pupils need to understand the inquiry approach and have developed confidence and some competence in the concepts and skills of the subjects they are linking together. The Seminar will cover different aspects of this progression which is outlined below.

### 1. Pre-requisites

- i) Motivation and understanding of inquiry and Nature of Science
- ii) Some knowledge of science concepts

### 2. Development of skills of other subjects which might be introduced before an inquiry, during and/or after an inquiry such as:

- i) Mathematical skills such as measuring and understanding scale
- ii) Use of ICT as a tool to support science / mathematics

### 3. Context for science inquiry provided by another subject or experience such as history and geography, a field visit, or a visit to a science centre or museum.

### 4. Greater links with other subjects where clear learning objectives are developed in two subjects.

The approach is likely to be different with language, mathematics and history / geography because conceptual progression requirements are different.

### 5. Fully integrated with learning objectives achieved in both subjects.





### **Keynote presentations**

- *Prof. Michael Reiss* will expand on 'The Nature of Science'. He has particular expertise in science education and bioethics.
- *Rosemary Feasey*, a leading expert in primary science who developed cross-curricular strategies with teachers in the Pollen Project in England.

### **Practical workshops including**

- Practical ways to develop teachers' understanding of the Nature of Science
- Developing skills of data handling in mathematics and science
- Case studies of English teachers' practice in the primary and first year of secondary school
- Developing Pre-Service teachers' understanding of mathematics and science
- Developing language in science
- Poetry and magnetism
- Running a Science Day

### **Demonstrating the use of out-of-school activities**

Out-of-school opportunities (visits to a science centre, field visits etc.) can also provide a context for cross-curricular science. Therefore delegates will visit

- Snibstone Discovery Centre an interactive museum, historic colliery railway, outside play areas and a Country Park and nature reserve, all located on the site of a former Colliery  
[http://www.leics.gov.uk/index/leisure\\_tourism/museums/snibston/snibston\\_about.htm](http://www.leics.gov.uk/index/leisure_tourism/museums/snibston/snibston_about.htm)
- University of Leicester Botanical Gardens

## **How to register?**

An on-line Booking Form will be available from late May 2011 with a timetable. The booking form will ask for details of the attendees, their travel arrangements, accommodation requirements and workshop choices. This form has to be sent to the Science Learning Centre (attention of Ann Brant [iab6@le.ac.uk](mailto:iab6@le.ac.uk)) University of Leicester, School of Education, 21 University Road, Leicester LE1 7RF OR Fax 44 (0)116 252 5772

## **Contact persons**

Prof. Tina Jarvis: [jar@le.ac.uk](mailto:jar@le.ac.uk)

Ann Brant: [iab6@le.ac.uk](mailto:iab6@le.ac.uk)



# TS2: Using the external environment of the school

## Dates

Monday 10th – Wednesday 12th of October 2011

## Venue of the training session

Helsinki/Espoo/Vantaa, Finland

## Aim and special topics

- Using the external environment of the school: especially
- How to use science centres to the benefit of classroom learning
- How to use nature to the benefit of classroom learning (outdoor activities)

## Contents

Schools are more and more open to using their external environment to teach science. The main issue in this European training session will be to describe how to bridge the gap between informal and formal education. The challenge addressed will be how to include IBSME-approach.

The program contains ideas of how to work in different external environments of the school. The European training session participants will have an opportunity to work in three different places.

- On one of the days, activities will be held in Heureka, the Finnish science centre (<http://www.heureka.fi>). There will be the opportunity to observe how Finnish schools and teacher students are using science centres as a learning laboratory (according to the three step model: before / pre-activities – during the visit – after / post-activities). One of the focuses will be on how to carry out IBSME activities in a laboratory designed for young children.
- One day will be spent in the Finnish National Park, Nuuksio (<http://www.luontoon.fi/>). It will be a special opportunity to work in nature, have an overview of what kind of outdoor activities are carried out by schools and to discuss and think about how to create IBSME-activities in one's day-to-day teaching practice. Of course, a visit to a sauna will conclude a hard day's work!
- One day will take place at the University of Helsinki, Department of Teacher education (<http://www.helsinki.fi/teachereducation/>). The program will include presentations about science education, IBSME activities and ICT tools. And of course, there will be lots of practical sessions.

During the three days, participants will get to know the Finnish system of working with the external environment of the school. Teachers and educators mainly from the Fibonacci Project will be invited to present materials and share their experiences and knowledge working on informal environments and IBSME. After the three-day seminar, all participants will have new thoughts, ideas, and hopefully, a new understanding of how to use the external environment of the school making use of the IBSME approach.





### **Keynote Speakers (to be updated)**

- *Martin Braund*: Dr., Senior Lecturer, Department of Educational Studies, University of York, United Kingdom
- *John H. Falk* (to be completed): Dr., Free-Choice Learning and Science Education, Oregon State University, United States
- *Tina Jarvis*: Dr., Professor, University of Leicester, United Kingdom (to be confirmed)
- *Hannele Niemi*: Dr., Professor of Education, Chair of the Board of Directors, CICERO Learning Network, President of Parents Association, University of Helsinki, Finland
- *Mikko Paalanen*: Professor, Director, Aalto University School of Science, Low Temperature Laboratory, Helsinki, Finland
- *Per-Edvin Persson*: Dr., Director of Heureka, the Finnish Science Centre, Finland
- *Patrik Scheinin*: Professor of Education and the Dean and former Vice Dean of the Faculty of Behavioural Sciences at the University of Helsinki, Finland
- *Petra Skiebe-Corrette*: Dr., Professor, Institute of Chemistry and Biochemistry, Freie Universität Berlin, Germany (to be confirmed)

### **Some themes of practical workshops, group discussions and demonstrations**

- Teachers using the external environment of the school all over Europe
- Science centres as an external environment
- Laboratories for young children integrating the IBSME approach
- Nature and forests: the nearest external environments of the schools
- Pedagogical opportunities to make use of outdoor activities

All keynote speakers, workshops and the whole program with guidelines will be loaded and updated to the webpage:  
<http://blogs.helsinki.fi/tiedekeskuspedagogiikka/tutkimushankkeet/fibonacci/>

### **How to register?**

Online registration form will be open in August 2011 on:  
<https://elomake.helsinki.fi/lomakkeet/26390/lomake.html>

### **Contact persons**

Hannu Salmi: [hannu.salmi@helsinki.fi](mailto:hannu.salmi@helsinki.fi)  
Arja Kaasinen: [arja.kaasinen@helsinki.fi](mailto:arja.kaasinen@helsinki.fi)





# TS3: Implementing and expanding a Reference Centre

## Dates

Monday 28th - Wednesday 30th of November 2011

## Venue of the training session

The seminar will be held at various locations of the **Freie Universität Berlin in Berlin Dahlem**. The specific locations will be made available after the registration.

## Contents

*Aim:* The aim is to inform about the building blocks which are to be taken into account when starting or expanding a reference centre that wants to promote IBSME in schools.

In several countries, Pollen and SINUS pilot projects have been so successful that they have created a high demand of new schools wanting to join the programs. Thus, due to the success of these local pilot programs, several partners are faced with the problem of "scaling up". On the other hand, Fibonacci partners are approached to share their experiences with institutions which would like to start such program.

In order to accommodate start-up programs as well as programs which would like to expand, a workshop will be offered that will address the following topics relevant for the consolidation and the spreading of a pilot project, as well for starting up a program:

- Inquiry-based science and mathematics education (IBSME)
- Professional development of teachers
- Material support
- Fitting with the curriculum
- Community involvement
- Evaluation

During the workshop, participants will get a hands-on introduction to inquiry-based science and mathematics education and will talk to different members of the Berlin community who support IBSME including people from foundations, the department of education, industry, and science academies. In addition, participants will be able to get an overview of the science and mathematics material that is used by the different countries participating in the Fibonacci project. Participants will have the opportunity to visit a material centre in Berlin that serves over a hundred primary schools.

### **Keynote presentations**

- *Prof. Louise Hayward and George MacBride* from the University of Glasgow will give an overview about the prerequisites for change by talking about «Change matters: Research, Policy, Practice, Learners».
- *Prof. Franz Rauch* from the Alpen-Adria Universität will talk about the "Role of regional networks" in order to highlight the idea of community involvement.





- A representative of *La main à la pâte* from the Ecole Normale Supérieure of Paris, will give a talk about the importance of evaluation and self-evaluation of IBSE practices.
- *Magda Kirsch and Yves Beernaert* from Educonsult, who are carrying out the external evaluation of Fibonacci, will summarise the findings about «Twinning - a useful tool of dissemination».

### ***Practical workshops will focus on the following topics***

- Inquiry science education in primary school (Ana G. Blagotinšek, University of Ljubljana, Slovenia)
- Inquiry science education in secondary school (Philippe Léonard, Experimentarium ULB, Belgium)
- Inquiry mathematics education in primary school (Janet Ainley, University of Leicester, United Kingdom)
- Inquiry mathematics education in secondary school (Mari-Ann Skovlund Jensen, University College South Denmark, Denmark)
- Distance Learning (Claus Auning, University College South Denmark, Denmark)
- Using Notebooks in IBSE (N.N., Freie Universität Berlin, Germany)
- Sinus: A way of professional development (Volker Ulm, University of Augsburg, Germany)
- IBSE and language development (Neşe Ersoy, Freie Universität Berlin, Germany)

### ***Visit of a material centre and exhibition of IBSE materials***

There will be a visit to a material centre that serves more than 100 primary schools. Within the centre, there will also be an exhibition of different teaching materials that are used by different Fibonacci partners, including the University College South Denmark (Denmark), Graduate School of Engineering – Saint-Etienne (France), Freie Universität Berlin (Germany), University of Ljubljana (Slovenia), Vinca Institute for Nuclear Science (Serbia), Free University of Brussels (Belgium).

### **How to register?**

To register, send an email to: [nese.ersoy@fu-berlin.de](mailto:nese.ersoy@fu-berlin.de)

or a fax to +49 (30) 838 50 684

The response mail will include suggestions for hotels and details about travel to and within Berlin (e.g. maps, ticket information).

### **Contact persons**

Nese Ersoy: [nese.ersoy@fu-berlin.de](mailto:nese.ersoy@fu-berlin.de) or [ersoy@tuwas-deutschland.de](mailto:ersoy@tuwas-deutschland.de)

Tel. (office): +49 (30) 838 53 291

Tel. (mobile): +49 (151) 56 14 36 73

Fax: +49 (30) 838 50 684

or

Prof. Petra Skiebe-Corrette: [skiebe@zedat.fu-berlin.de](mailto:skiebe@zedat.fu-berlin.de)



# TS<sub>4</sub> : Deepening the specificities of inquiry in mathematics

## Dates

Wednesday 15th – Friday 17th February 2012

## Venue of the training session

The Seminar will be held at the **Arvena Hotel in Bayreuth**. It is located a short distance from the city centre of Bayreuth. Details can be found at <http://www.arvena-kongress.de/en/hotel.html>

## Contents

Schools must provide for more than just mere knowledge, they must provide education. Mathematical education consists, among other things, of the following elements:

- appreciation of mathematics
- confidence in one's own ability to be able to deal with mathematics
- application of mathematical knowledge to mathematical and non-mathematical tasks
- the ability to use mathematics as a form of communication and expression
- mathematical thinking.

A pedagogy using an inquiry-based approach establishes successful ways for realising these elements. There are certain fundamental guiding concepts that typify instruction of inquiry-based (respective problem-oriented) mathematics education at school.

### ***These include***

- less knowledge acquisition, more problem-solving instruction,
- less orientation towards calculation, more focus on comprehension,
- learning mathematics in context ("storytelling", mathematics as a cultural asset),
- attention not only to results but also to the learning strategies and learning processes.

The seminar will cover manifold aspects of inquiry based mathematics education, taking into account the aims named above.

### ***The seminar will be organised in two sections:***

- *Keynote presentations* given by international experts on mathematics education on the one hand.
- *Practical workshops* on the other hand including
  - Rich learning tasks connecting mathematics and "the real world"
  - Hands-on mathematics
  - Dynamic mathematics as instrument to foster inquiry-based and problem oriented mathematics
  - Cross disciplinary approaches in mathematics education





## How to register?

An on-line registration form will be available from November of 2011 on the Fibonacci website ([www.fibonacci-project.eu](http://www.fibonacci-project.eu)). The registration form will ask for details of the attendees, their travel arrangements, accommodation requirements and workshop choices.

## Contact persons

Dagmar Raab: [dagmar.raab@uni-bayreuth.de](mailto:dagmar.raab@uni-bayreuth.de)

Thomas Stiegler: [thomas.stiegler@uni-bayreuth.de](mailto:thomas.stiegler@uni-bayreuth.de)



# TS5: Deepening the specificities of inquiry in natural sciences

## Defining, Implementing and Assessing Inquiry-Based Science Education (IBSE) from Kindergarten to Middle School

### Dates

Wednesday, March 20th – Friday, March 23rd, 2012

### Venue of the training session

The Seminar will be held at the **International Centre of Pedagogical Studies (CIEP)**, located in **Sèvres**, very close to the centre of Paris, easily connected to the city by metro and tram. Details can be found at <http://www.ciep.fr/en/index.php>.

### Contents

*Main aim:* to better define inquiry-based science teaching by exploring teaching and learning practices, and to disseminate strategies for its implementation and tools for its assessment.

#### **Specific objectives**

- to better define IBSE in terms of teaching and learning practices;
- to explore similarities and differences between IBSE practice at kindergarten, primary, and middle school levels;
- to understand the issues at stake at the different stages of consolidation of an IBSE project;
- to explore teacher training and support activities in the framework of IBSE;
- to discuss assessment of teacher Continuing Professional Development (CPD) in IBSE;
- to share strategies for formative and summative assessment of student learning in IBSE.

#### **Rationale**

Throughout this training session, participants will be asked to reflect upon how inquiry-based science education translates into observable classroom practices. This should allow participants to:

- develop a better understanding of IBSE;
- identify the components of IBSE that can be adapted to their national contexts, from those which can be shared by all;
- engage a back-and-forth dialogue between theory concerning best practices on IBSE and classroom practice in context;
- provide teachers and teacher trainers with the means to assess their own practices;
- build a basis for communicating the essence of good quality science education to parents, the public and others concerned with education.



This TS intends to offer the participants a space for productive dialogue between research on science education and practice. To ensure this dialogue, Dr. Wynne Harlen, a leading expert in primary school science teaching and a member of the Fibonacci Scientific Committee (<http://fibonacci.uni-bayreuth.de/index.php?id=203>), is closely advising the group in the conception of the seminar and will contribute to its development.

### ***Keynote presentations***

There will be three keynote presentations, one for each of the key topics of the seminar (defining, implementing and assessing IBSE). The names of the speakers will be communicated soon.

- Speaker 1 will talk on our knowledge of how children learn and how it underpins IBSE
- Speaker 2 will talk on the consequences of research concerning the design of continuing professional development programs for teachers
- Speaker 3 will talk on the assessment of pupils' learning in IBSE

### ***Practical workshops will include***

- An inquiry-based science learning activity
- Visits to inquiry-based science lessons at different levels of schooling
- A systemic approach to IBSE implementation
- Training teachers in IBSE through workshops
- Mentoring teachers inside the classroom
- Diagnosing CPD initiatives and taking action
- Formative and summative assessment of student learning in IBSE

### ***Poster session***

Participants will be invited to display their IBSE programmes identifying the numbers and types of classes and schools involved. They will be asked to describe two examples of good practices and two examples of problems encountered in teacher CPD at their particular stage of implementation.

## **How to register?**

An on-line booking form will be available on the Fibonacci website from May 2011 until January 2012 with a timetable. The booking form will ask for details of the attendees, their travel arrangements, accommodation requirements and workshop choices.

## **Contact person**

Susana Borda: [suzana.borda@inrp.fr](mailto:suzana.borda@inrp.fr)

*La main à la pâte*

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# consortium members



# Credits

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[www.lezard-graphique.net](http://www.lezard-graphique.net) - 2010

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
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Stefano Bolognini





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## PARTNERS

### EUROPEAN COORDINATION

 **France** - *La main à la pâte* (French Academy of sciences, INRP, École normale supérieure Paris). For the purpose of Fibonacci, the École normale supérieure is the legal entity coordinating the project.

### SCIENTIFIC COORDINATION

Science:  **France** – *La main à la pâte*      Mathematics:  **Germany** – University of Bayreuth


### REFERENCE CENTRES

 **Austria** – University of Klagenfurt    **Denmark** – University College South Denmark    **France** – ARMINES/ Graduate School of Engineering of St Etienne    **France** – Graduate School of Engineering of Nantes    **Germany** – Free University of Berlin    **Germany** – University of Augsburg    **Germany** – University of Bayreuth    **Netherlands** – University of Amsterdam    **Slovakia** – University of Trnava    **Slovenia** – University of Ljubljana    **Sweden** – Royal Swedish Academy of sciences    **United Kingdom** – University of Leicester














### TWIN CENTRES 1

 **Belgium** – Free University of Brussels    **Bulgaria** – Institute of mathematics and informatics of the Bulgarian Academy of sciences    **Estonia** – University of Tartu    **Finland** – University of Helsinki    **Greece** – University of Patras    **Ireland** – St Patrick's College    **Portugal** – Ciencia Viva, National Agency for Scientific and Technological Culture    **Luxemburg** – University of Luxemburg    **Romania** – National Institute for Lasers, Plasma and Radiation    **Serbia** – Vinca Institute for Nuclear Sciences    **Spain** – University of Cantabria    **Switzerland** – University of Zurich.

### ASSOCIATED PARTNER FOR THE GREENWAVE PROJECT

 **Ireland** – Discover Science and Engineering - Discover Primary Science.

### TWIN CENTRES 2

 **Austria** – generation innovation ForschungsScheck    **Belgium** – Dienst Katholiek Onderwijs    **Denmark** – NAVIMAT, Danish National Centre for Mathematics Education    **Denmark** – VIA University College    **France** – University of Nancy    **Germany** – Cologne & Bonn Chambers of Commerce and Industry    **Germany** – Thuringer Institut für Lehrerfortbildung    **Italy** – National Association of Science Teachers    **Poland** – Jagiellonian University    **Spain** – University of Alicante    **Turkey** – Academy of sciences / TUBA    **UK/Scotland** – University of Glasgow    **UK / Northern Ireland** – Queens University.

## CONTACT DETAILS

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