From Stage to Classroom –
the Transfer of Knowledge through
the Festival "Science on Stage"

The paper to this presentation has been submitted to
*MRS Advances.*
Introduction

- Science festivals
  - to raise public interest
  - to increase number of scientists
  - “Despite large numbers of participants and strong media coverage, many of these activities significantly lack sustainability if the involvement of schools and teachers remain unconsidered”
    Weingart, Pansegrau et al. 2007, University Bielefeld report

- STEM teachers
  - Key disseminators of scientific knowledge
  - Acquire knowledge through pre- and in-service training
  - Individual decision on what to bring into the classroom

- Which aspects of STEM teacher trainings assure efficient transfer of up-to-date knowledge to real classroom activity?
Science on Stage

European large scale STEM teacher training initiative

- **SonS Festivals**
  - 2008 Berlin (Germany)
  - 2011 Copenhagen (Denmark)
  - 2013 Słubice/Frankfurt (Oder) (Poland and Germany)
  - 2015 London (UK)
  - 2017 Debrecen (Hungary)

- **Componets of festivals**
  - On-stage performance
  - Exhibition („fair“)
  - Workshops, seminars
  - Award ceremonies

Source: www.science-on-stage.de
On stage-performance

Photos: Lässig
Fair of projects

Photos: Lässig
Award ceremonies

Photos: Lässig
Funding

- Federation of German Employers' Associations in the Metal and Electrical Engineering Industries
- Employees (Sept. 2016): 3,835,700
SonS 2013

- Festival 2013, hosted by Germany and Poland in Słubice/ Frankfurt a.d. Oder 2013
Participants

- 234 teachers from 27 countries

physics teachers > 60%

Which subjects do you teach?
Evaluation

- Research question
- What is the relevance of the individual aspects of SonS?
- In which way is science on stage successful?
  - To increase one’s own knowledge?
  - To learn from experts?
  - To be on stage?
  - To win a price?
  - To meet colleagues?
  - To share experiences?
  - ...?
Evaluation

A measure is regarded **successful** when the **effects** meet the **objectives** and expectations of the initiators and sponsors.

What are the **goals**?

What are the **effects**?

A B C = X Y Z

successful

Bortz, Döring 2006 (Springer); Zarinpoush 2006
Methodology

- **Objective analysis** (steering committee) ➔ A B C
- **Pre-test** (6 months before the festival)
- **Interviews** (during the festival)
- **Post-test** (immediately after the festival) ➔ X Y Z
- **Follow-up test** (1 year after the festival)
Objective analysis – Problem tree

Students are not interested in science and do not choose science careers

- Students regard teacher as incompetent
- Students do not feel addressed
- Teachers become unable to show exciting things
- Lack of knowledge and know-how
- Lack of connection to everyday life
- Lack of motivation and joy

Teacher trainings fail to prepare teachers to enthuse students

The logical framework approach, AusGUIDElines 2005, Tajmel, Starl et al. 2009
Objective analysis – **Objective tree**

**CAUSE**

- Teachers possess profound knowledge
- Teachers are motivated and have joy
- The science lessons are connected to everyday life
- Students feel addressed by the science lesson
- Students regard teacher as competent
- Teacher trainings succeed to prepare teachers to enthuse students

**EFFECT**

- Students are interested in science and do choose science careers.
- Science teaching is enthusiastically
- Students feel addressed by the science lesson
- Students regard teacher as competent

The logical framework approach, AusGUIDElines 2005, Tajmel, Starl et al. 2009
Objective analysis - Dimensions

Students are interested in science and do choose science careers.

CAUSE

Increasing knowledge
Improving the way of teaching
Changing personal attitudes

Teacher trainings succeed to prepare teachers to enthuse students

EFFECT

Students are interested in science and do choose science careers.

The logical framework approach, AusGUIDElines 2005, Tajmel, Starl et al. 2009
Questionnaire

- Pretest: What would you need?
- Posttest: What was your benefit from SonS?

3 Dimensions, 20 items:

- Increasing knowledge
- Improving the way of teaching
- Changing personal attitudes

Online Questionnaire: Carsten Schmitz, LimeSurvey Project Hamburg, Germany (2015)
Changing personal attitudes

(very strong affirmation of more than 70% teachers)

(50 - 70% teachers)
**Strengths**

- Students are not interested in science and do not choose science careers.
- Teacher trainings fail to prepare teachers to enthuse students.
- Lack of knowledge and know-how.
- Lack of connection to everyday life.
- Lack of motivation and joy.

**CAUSE**

- Teacher trainings succeed to prepare teachers to enthuse students.
- Increasing knowledge.
- Improving the way of teaching.
- Changing personal attitudes.

**EFFECT**

- Students are interested in science and do choose science careers.

**Increasing knowledge**

**Improving the way of teaching**

**Changing personal attitudes**
Impact

- **Impact on science lesson**
  - **Post-test:** 58% planned to implement >3 ideas
  - **Follow-up:** 44% already implemented >3 ideas, 84% at least one

- **International impact**
  - 69% stay in (international) contact with more than two persons they met at the festival
  - 64% base their own teacher-training activities in their home countries on SonS
Conclusion

- Research question
- What is the relevance of the individual aspects of SonS?
- In which way is science on stage successful?
  - To increase one’s own knowledge
  - To learn from experts
  - To be on stage
  - To win a price
  - To meet colleagues
  - To share experiences

Thank you!
Citations


Science on Stage Deutschland e.V. http://www.science-on-stage.de/


T. Tajmel, Evaluation reports, Science on Stage Europe. URL http://www.science-on-stage.eu/page/display/4/17/0/evaluation-reports

www.science-on-stage.de

www.science-on-stage.eu