

## SAUCE Schools at University for Climate and Energy



## WP 6

## Evaluation report 2010

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2<sup>nd</sup> cross country report  
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### **About SAUCE – Schools at University for Climate and Energy**

For the EU project SAUCE, seven European universities and the Berlin Energy Agency have joined forces to develop and promote university programs for schools as an innovative educational tool aiming to make younger generations adopt intelligent energy behaviour. From 2010 until 2011, each university offers a series of one-week on-campus education programs for pupils' ages 10-13 on the topics of energy efficient behaviour, renewable energies and climate change in an exciting new learning environment.

The programs are complemented by activities reaching out to the pupils' teachers. Successful and effective teaching materials and information sources are made available, energy education experts and their teaching approaches are introduced to the teachers, and the exchange of knowledge and ideas between schools, academics and educators is facilitated. SAUCE thus contributes to improving teaching and curriculum on energy efficient behaviour.

SAUCE is supported by the EU Program Intelligent Energy Europe. This program aims to promote energy efficiency and renewable energy sources. It helps all of us to produce and use energy in more intelligent ways and to increase the use of renewables.

For more information on SAUCE: [www.schools-at-university.eu](http://www.schools-at-university.eu)

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## Contents

<b>1 Introduction: The aim of evaluation in the SAUCE project .....</b>	<b>3</b>
<b>2 Methodology .....</b>	<b>5</b>
<b>2.1 Locally applied methods .....</b>	<b>5</b>
<b>2.1.1 Aalborg .....</b>	<b>5</b>
<i>Children .....</i>	<i>5</i>
<i>Teachers.....</i>	<i>5</i>
<i>Lecturers .....</i>	<i>5</i>
<b>2.1.2 London .....</b>	<b>5</b>
<b>2.1.3 Berlin .....</b>	<b>5</b>
<i>Introduction .....</i>	<i>5</i>
<i>Children .....</i>	<i>6</i>
<i>Teachers.....</i>	<i>6</i>
<i>Lecturers .....</i>	<i>7</i>
<i>Volunteers.....</i>	<i>7</i>
<b>2.1.4 Twente .....</b>	<b>7</b>
<i>Introduction .....</i>	<i>7</i>
<i>Children .....</i>	<i>8</i>
<i>Teachers.....</i>	<i>9</i>
<i>Lecturers .....</i>	<i>9</i>
<i>Core team and volunteers .....</i>	<i>9</i>
<b>2.1.5 Vienna .....</b>	<b>9</b>
<i>Children .....</i>	<i>9</i>
<i>Teachers.....</i>	<i>9</i>
<i>Lecturers .....</i>	<i>10</i>
<i>Core team and volunteers .....</i>	<i>10</i>
<b>2.1.6 Latvia.....</b>	<b>10</b>
<b>2.1.7. Roskilde.....</b>	<b>10</b>
<b>3 Findings by country .....</b>	<b>11</b>
<b>3.1 Introduction .....</b>	<b>11</b>
<b>3.2 Aalborg.....</b>	<b>11</b>
<b>3.2.1 Children .....</b>	<b>11</b>
<b>3.2.2 Teachers.....</b>	<b>12</b>
<i>General impression .....</i>	<i>13</i>
<b>3.2.3 Lecturers .....</b>	<b>13</b>
<b>3.2.4 Conclusion .....</b>	<b>13</b>
<b>3.3 London .....</b>	<b>14</b>
<b>3.4 Germany .....</b>	<b>15</b>
<b>3.4.1 Children .....</b>	<b>15</b>

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<b>3.4.2 Teachers</b> .....	<b>18</b>
<b>3.4.3 Lecturers:</b> .....	<b>23</b>
<b>3.4.4 Volunteers/organizing committee</b> .....	<b>23</b>
<b>3.4.5 Conclusions</b> .....	<b>24</b>
<b>3.5 Twente</b> .....	<b>24</b>
<b>3.5.1 Children</b> .....	<b>24</b>
<b>3.5.2 Teachers</b> .....	<b>29</b>
<b>3.5.3 Lecturers and volunteers</b> .....	<b>38</b>
<b>3.5.4 Conclusion</b> .....	<b>39</b>
<b>3.5.5 Lessons of the 2010 program</b> .....	<b>39</b>
<b>3.6 Vienna</b> .....	<b>40</b>
<b>3.6.1 Children</b> .....	<b>40</b>
<b>3.6.2 Teachers</b> .....	<b>43</b>
<b>3.6.3 Lecturers</b> .....	<b>49</b>
<b>3.6.4 Volunteers/organizing committee</b> .....	<b>49</b>
<b>3.6.4 Conclusions</b> .....	<b>51</b>
<b>3.6.5 Local revisions</b> .....	<b>51</b>
<b>3.6.6 Lessons learned for the SAUCE format</b> .....	<b>52</b>
<b>3.7 Latvia</b> .....	<b>52</b>
<b>4 Conclusion and recommendations</b> .....	<b>53</b>
<b>4.1 Conclusion on evaluation approach and method</b> .....	<b>53</b>
<b>4.2 Conclusion on program content and quality</b> .....	<b>53</b>
<b>4.3 Conclusion on program impact</b> .....	<b>54</b>
<b>4.4 Lessons learned from the 2010 program run</b> .....	<b>55</b>
<b>Annex SAUCE strategic and specific objectives</b> .....	<b>56</b>

## 1 Introduction: The aim of evaluation in the SAUCE project

In the SAUCE project evaluation serves to improve the content and quality of the program and to monitor and assess the impact of the SAUCE program.

With respect to quality and content of the program, the evaluation draws on the perception of the participating pupils, teachers and lecturers and all others who were involved in the local SAUCE programs offered by the partners of the consortium. The consortium members offering the SAUCE program are:

- Freie Universität Berlin, Environmental Policy Research Centre (FFU) (Germany)
- Vienna University of Technology, Institute of Power Systems and Energy Economics, Energy Economics Group (Austria)
- Aalborg University, Department of Development and Planning (Denmark)
- Roskilde University, Department for Environmental, Social and Spatial Change (Denmark)
- Berlin Energy Agency (Germany)
- University of Latvia, Department of Environmental Management (Latvia)
- University of Twente, Twente Centre for Studies in Technology and Sustainable Development (The Netherlands)
- London Metropolitan University, Department of Applied Social Sciences (United Kingdom)

With respect to impact the evaluation distinguishes between impacts at three different levels: the individual, the network and the institutional level. These three levels have been derived from the operational and strategic objectives of SAUCE. With respect to the three levels the evaluation aims to assess:

- At the individual level SAUCE' impact on the mindset of participating pupils and teachers of primary schools as far as this is possible in the context and with the means of this project.
- At the network level the development of the actor constellations initiated by the SAUCE program in the participating countries
- At the institutional level the embeddedness of the energy and climate theme in primary schools' curricula and the diffusion of the SAUCE program to other universities.

The first evaluation report could only tentatively address the impact of SAUCE at the individual level of pupils and teachers. The second evaluation report takes one step further by assessing the impact of SAUCE with respect to the development of the networks of the consortium partners in the participating countries.

In 2010 report the evaluation of the impact of the program on the mindset of participating pupils and teachers therefore is added with information on local network development.

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Like in 2009 the SAUCE 2010 evaluation report's major focus is on the perception of the content and quality of the program by the participants: pupils, teachers, lecturers and volunteers which organized, performed and participated at the one-week on-campus education programs at seven European Universities. Several partners used the same evaluation format as last year and this enables to make comparisons between the evaluation results of 2009 and 2010. The 2010 report follows a similar structure as the 2009 report, meaning that the second chapter describes the general method and the country-specific methods used in the evaluations. The third chapter documents the evaluation results of each 2010 partner program separately. Chapter 4 draws conclusions and suggests recommendations.

## **2 Methodology**

Written and oral questioning of participants was the consortium's common method in the 2010 evaluation. The consortium members used single page combined open and closed questionnaires, added by unstructured interviews (Berlin, Aalborg, Vienna), SWOT analysis (Twente and Vienna), discussion with pupils and teachers (Aalborg) and feedback from intermediary institutions and from pupils' letters (London). Twente, the WP-6 leader in the consortium, made suggestions for questions to the consortium members who processed them into locally specified questionnaires.

### **2.1 Locally applied methods**

#### *2.1.1 Aalborg*

Like in 2009, the Aalborg team visited several schools in 2010 to evaluate the program. In 2010 the following schools were visited:

##### *Children*

- Vejgaard østre a 5. class with 22 pupils
- Klarup a 5. class with 20 pupils
- Sennels a 6. class with 17 pupils

The evaluation visits had two parts:

- Under the guidance of the team and the teachers the pupils filled in the questionnaire.
- A class discussion to allow children to elaborate certain points and aspects of the program.

##### *Teachers*

The teacher questionnaires were handed out during the common introduction at the beginning of each program day of the 2010 program run. Only five teachers send in a filled-in form. The low teacher response is probably caused by the instant start of summer holiday after the 2010 program run.

##### *Lecturers*

Lecturers were also questioned with the help of a questionnaire, which was send to them by email. Six filled-in questionnaires returned.

#### **2.1.2 London**

See chapter 3

#### **2.1.3 Berlin**

##### *Introduction*

The 2010 SAUCE programs at the Free University of Berlin were held from 15-19 March and 27 September – 1 October 2010. Prior to the programs teacher information meetings were held on 18 February and 16 September 2010. Taking regards of the organisational challenges faced at the previous programs, in 2010 the workshops and lectures were held at buildings in close vicinity to each other, i.e. at the Otto-Suhr-

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Institute for Political Science and the Henry-Ford-Building, with the exception of workshops and events at laboratories and excursion sites. The autumn program also offered activities for the pupils in the entrance hall (pedal powered film show).

The evaluation of the SAUCE programs is based on data collected during and over the two to three weeks after the programs. The database collected on the second program in 2010 was much larger than that collected on the first. Both surveys focussed on that of the teachers.

In addition to questions on general organisational aspects and the teachers' satisfaction with individual workshops/lectures, the monitoring activities also inquired about indirect effects of the SAUCE program, i.e. effects on the school context, about different topics dealt with at school, and about activities undertaken in preparation of and after participation in the SAUCE programs. One important source for the evaluation is the questionnaires handed out to teachers and collected during the events. After the program, questionnaires were sent out per e-mail to inquire about follow-up activities. The questionnaires are available at the Berlin SAUCE team. The results are supplemented by the conclusions drawn from numerous personal exchanges with teachers during the program. Some of these comments could immediately be communicated to the lecturers allowing them to adjust important details in their second round. Furthermore, team members and auditors filled in questionnaires while sitting in to listen to different workshops/lectures at the fall program. One of the university's students inquired into qualitative effects on pupils of one workshop in her master thesis. Finally, two evaluation meetings were held on 24 and 25 November 2010 with teachers and speakers to reflect on methods, quality, and impact on children and teaching.

### *Children*

A total of 1640 pupils took part in the program. Altogether 2365 places were booked for them over the program week, thus most children participated in two program parts. The places were given to 120 different classes from 43 schools. As shown in the diagram, the majority of children were 6<sup>th</sup> graders and due to the fact that at some schools children are taught in mixed classes, some fourth graders attended the program.

The children were surveyed by questionnaires handed out and collected right after the event and only at the second program in Sept/Oct 2010. Student team members sat in at 17 of the 24 different workshops/lectures and answered questionnaires. Furthermore, in depth interviews were held at two schools as part of a master thesis.

Of the 1640 pupils who took part in the autumn program, 101 pupils participated in the survey and filled in questionnaires, i.e. 6,2%. They were collected from children after 5 of the 24 different program parts.

### *Teachers*

The survey of teachers inquired about their satisfaction with the SAUCE program, and about the content of their teaching before and after the SAUCE program. The March 2010 program was only partially surveyed. A total of 23 questionnaires were distributed and collected from teachers during the program week and all teachers who had enrolled were sent electronic questionnaires after the program. The

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September/October 2010 program was surveyed at more depth, particularly at the event itself. Generally, the response to the questionnaires sent by e-mail is very low and only about 9 and 7 questionnaires, respectively, were sent back after the programs, so that the response rate was about 5%. Reasons for this might be that

- teachers receive too many e-mails,
- answering electronically is not really convenient and discouraging, because not every teacher has a fast internet connection at their private home,
- the e-mail is sent in bulk mail and may be filtered out as spam.

The data collected during the fall program show a much higher response rate. Of the total of 135 teachers who participated in the SAUCE program, 60 handed in questionnaires, i.e. 46 %. The diagrams included in this report are based on the data collected in this survey.

Valuable insights into the perception of the Berlin SAUCE program by teachers were received at the meetings held on November 24 and 25, 2010 with a small selection of teachers and speakers.

#### *Lecturers*

Lecturers have not been surveyed by questionnaires but through personal communication. In comparison to the first program runs, communication with lecturers has been intensified for the 2010 programs. After a few clear failures of workshop and particularly of lecture concepts, the organising team at BEA and FUB decided to intensify the exchange with lecturers on principles and ideas. Therefore, new additions to the program have been discussed much more intensively with regard to the content and methods. This has clearly contributed to raising levels of quality. Furthermore, organisers facilitated the contact of lecturers with teachers before the event. This helped to allow lecturers adapt to the knowledge level of the classes. Teachers in turn, knew what to expect and which preparation in class would match with the program.

#### *Volunteers*

The organising committee and the staff were asked to summarise their comments. Furthermore, among those most intensely involved oral exchange of experience took place.

### **2.1.4 Twente**

#### *Introduction*

The Twente program runs once a year. The 2010 program ran from 6-12 April, from Tuesday till Tuesday because of an extra Eastern holiday in the program week. Twente is confined to the two weeks in April due to the availability of lecture rooms at the campus. Two weeks are examination weeks for students in April, which means that lecture rooms are available for other activities such as SAUCE. During the semester, lecture rooms are strictly reserved for lectures. A related restriction is that the Twente campus is still heavily under reconstruction which is on account of availability of lecture rooms and the accessibility of the campus. Some groups entered the program in delay, because they faced problems finding their way on campus despite intensive extra routing by the SAUCE organising committee. The 2010 program had approximate 900

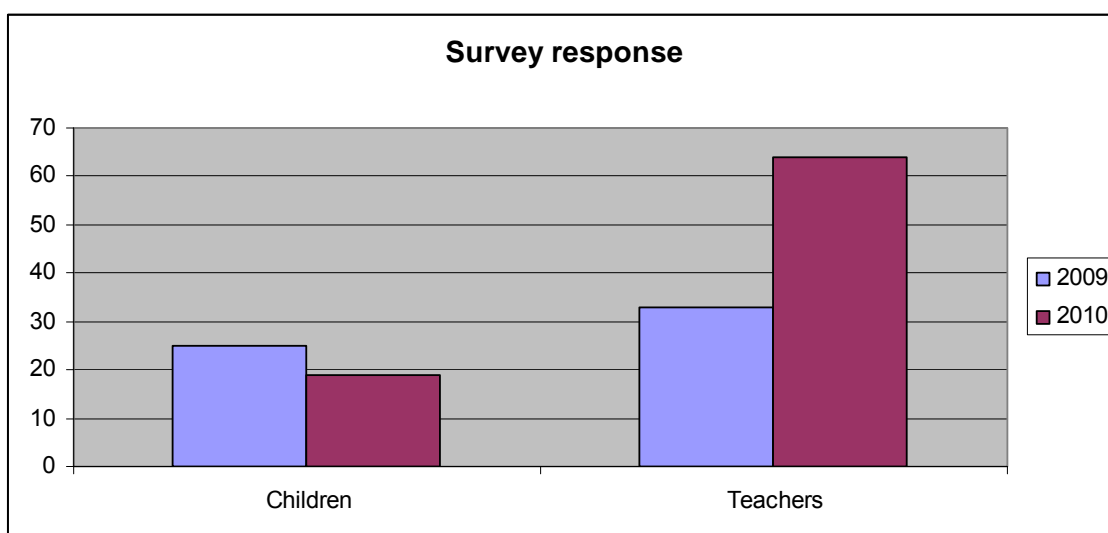
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participating pupils from 14 schools in Enschede and Hengelo. This is almost twice the number of attending pupils in the 2009 program. The popularity of SAUCE is clearly growing. It seems that the first program attracted really engaged schools and classes, whereas in 2010 the participating groups were more mixed and diverse. This is probably also one of the reasons why the results of the 2010 evaluation reflect less enthusiasm for the program than the 2009 evaluation. However, despite this slightly change in perception, the overall picture of the 2010 program run reflects enthusiasm of both pupils and teachers.

The 2010 program had more activities than the 2009 program, among others more workshops and excursions. We also added entertainment which was well received. The evaluation format of the 2010 program was similar to 2009, which allows a comparison between the two evaluations. The evaluation results are presented in tables comparing data from 2009 and 2010.

### *Children*

Attendant pupils have been questioned immediately after each program part by means of a questionnaire. The questions addressed the content, quality and leaning effect of the 2010 program. Pupils where also asked their opinion on the university as learning environment. The participating pupils were rewarded with some sweets, to attracted also pupils less interested in the program or/and evaluation. The pupils were allowed to participate after every lecture and/or workshop even if they already had filled in a form for another course on another day. However many pupils did not want to do the questionnaire more than once. The table below shows the response of the survey of children and teachers. Due to the fact that more children attended the program in 2010, more children filled in the questionnaire. However the response percentage was less than in 2009. The lower response can partly be explained by the tighter program schedule which gave the children less time to respond.



### *Teachers*

Three weeks after the program, the teachers of the participating classes received a questionnaire by email. The questionnaire asked questions about the program content, structure, timing and location. The teacher response to the 2010 questionnaire was almost twice that of the 2009 survey. All in all the response in 2010 gave again a good idea of the quality of the program.

During the program week we also talked to teachers and accompanying parents. All classes were accompanied by parents who organise the transport of the children from the school to the university. Primary schools hardly have budget for organised travelling. That is why parents offer transportation for free on a voluntary base. Quite often participation in activities in external programs is blocked because of lack of voluntary transportation. The local SAUCE team took the opportunity to talk to teachers and parents before and after the program and in the breaks about the program. The results of these talks are not included in the description of evaluation results, because it is hardly possible to process these qualitative findings in a systematic way. We can only indicate that the incidental talks in general confirm the overall impressions about the program as reflected in the evaluation results below.

### *Lecturers*

Immediately after the program activity or a couple of days later, the lecturers were all asked for their impression and points of improvement. We contacted each lecturer separately and talked to them in person or by phone. In the 2010 evaluation we found no remarkable differences in experience of the lecturers except the point that the 2010 groups in general appeared to be more difficult to access than the 2009 groups.

### *Core team and volunteers*

The core team and the volunteers made a so-called SWOT analysis to get an overview of the different aspects of the program and organisation. The individual SWOTS have been discussed and exchanged in a meeting resulting in a list of improvements for the next program run.

## **2.1.5 Vienna**

### *Children*

Interviews with pupils guided by a short questionnaire: The student assistants picked two or three pupils per class and carried out in depth personal interviews with each of them (separately). For the questionnaire see Annex 1. Since the average number of pupils per class was about 23-24 this time, this procedure covered a bit more than 10% of all attending pupils.

### *Teachers*

The questionnaires were handed out to the teachers at the registration desk. The student assistants supported the teachers in case of questions and collected the completed questionnaires. Due to this procedure a 70% response (56

questionnaires) was achieved<sup>1</sup>. However, not all questionnaires included responses to all questions. For this teacher questionnaire see Annex 2.

#### *Lecturers*

Feedback from lecturers: We were in close personal contact with the lecturers and asked them for their feedback. This feedback was not formalized or structured, which allowed receiving very individual and personal comments about their experience.

#### *Core team and volunteers*

Feedback from student assistants: Student assistants were asked to give a written feedback about their impression and ideas of the logistical, organizational, pedagogical content, quality of the whole event and the workshops they attended. This written feedback was carried out in group work with each 4-5 students.

Feedback from the organization team: Members of the organization team visited the workshops and lectures and summarized their individual impression of these events as well as their perception of the organization.

### **2.1.6 Latvia**

### **2.1.7 Roskilde**

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<sup>1</sup> Two teachers guide a class at the SAUCE event usually. So, 80 teachers participate but in some cases only one teacher per class wanted to complete the questionnaire.

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### 3 Findings by country

#### 3.1 Introduction

This chapter describes the evaluation findings of the consortium partners separately. Based on the local findings the next chapter will draw general conclusions and will make recommendations.

#### 3.2 Aalborg

##### 3.2.1 Children

When asked about what they had liked about our program (SKUB) it is obvious that doing things themselves like making a solar cell battery for charging their mobile phones or measuring water waves in the experimental basin while wearing waders are at the top of their list. The spectacular like experiments with liquid nitrogen or generation of high voltage sparks is also appreciated.

Still more passive and theoretical workshops like a power point presentation on "Energy systems of the future" was found interesting by a number of children.

Some were pleased to learn something new. Only 10 out of the 78 we interviewed said that had not heard or seen anything new.

They did not like too much theory, lengthy speakers and the introductory speeches where we presented SAUCE and its aims.

They were asked to mark the lecturers on a scale 2, 4, 7, 10, 12 (corresponding to the grading used in Denmark).

52% marked the lecturers 10 or 12 and 80% marked them 7, 10 or 12.

In the questionnaire we asked if they would like to again attend a program at the university.

More than 80% said yes. Some even said "yes, yes, yes, yes, yes" or "yes of course"

The few *no* and *maybe* are not reliable as some of them apparently said *no* or *maybe* to attending the same program once again.

The pupils were asked to rate the lecturers *very good*, *good* and *bad*

90 % rated the lecturers very good or good.

It is obvious that our efforts to get the lecturers to involve the pupils more, to demonstrate things rather than talking and to reduce the more theoretical parts have helped to some degree. It is also obvious that there is room for improvement.

It would be useful if it was possible to "educate" the lecturers on the characteristics of pupils of the age of 12-13 but this would require economic means which we do not have at our disposal.

Almost all the pupils would like to participate in another pupils university. Only 3 said *no*.

*General impression*

The children were pleased with attending our program even if they had some complaints on the theoretical level, the lecturers' use of technical terms and the lack of practical work.

It is impossible to say anything about what the effect on the children's perception of energy and climate has been. Both short term and long term effects. We must try to find a way of measuring this.

We found the remarks and questions of the children to be surprisingly mature and constructive.

Girls and boys seemed to be equally active in the discussion except maybe in one class. We should consider investigating this further after the next program.

The general impression is the same as in 2009 but the pupils were more satisfied with the program probably because of the greater emphasis on its practical part.

And again we must emphasize the quality of the pupils constructive suggestions to improve our program.

*3.2.2 Teachers*

The answers we got correspond to the ones from the children. Generally speaking the theoretical level was too high and there was too little taking part in some activity.

Two teachers found the program useful for them to update their professional competence.

The material which was electronically at the disposal of the teachers had been little used probably because it was published too late to be included in the preparation, the level is too high and the description not sufficiently detailed.

The teachers missed a closer cooperation among the lecturers to avoid overlap and they missed a pedagogic preparation of the teachers who should know more about the level of the children.

They were very satisfied with the electronic notice and enrolment we applied and satisfied with the organization of the program. But they missed precise information on where to spend the breaks and where to have their packed lunch.

They wanted the program advertised a longer time in advance in order to be able to plan their teaching and their possible visit to the university.

This year we got questionnaires back from 7 teachers covering 10 classes.

It is apparently still difficult to get all the participating teachers to return their questionnaires. We are considering the possibility of making it possible to fill in the forms electronically.

The teachers were asked to mark the content of our program and the performance of the lecturers on a scale from 1-5.

The average was 4.

When asked about their impression of their pupils satisfaction on the scale from 1-5

The average was also 4.

This year the teachers were more satisfied with the organisation of our program,

On the scale from 1-5 the average was 4,5.

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### *General impression*

The teachers find the program very attractive and they want to visit a program at the university with their future classes.

They want the same alterations in the program as the children and they want a better preparation of the lecturers maybe a cooperation between teachers and lecturers beforehand. This has economic consequences.

One headmaster whom we talked to at one of our visits was overwhelmingly enthusiastic and claimed that SKUB was just what he had been waiting for. He hoped that the program in the future would be a permanent part of the university's activity.

It is obvious that the teachers are quite pleased with their visiting our program.

Their remarks and suggestions are in keeping with what we more or less know beforehand.

We shall still try to follow the suggestions although we in many cases do lack the practical circumstances and the funds to do so.

### *3.2.3 Lecturers*

All lecturers were more or less satisfied and all of them would like to participate in SKUB in the future. They would like to know more about the qualifications of the children. Do they know about percentages? , can they read a graph? , what do they know about energy? They found it difficult to handle the large spreading in the technical background and interest of the children. Some were informed teenagers and some were definitely not. They propose having smaller groups (10 – 12 children) and a better coordination among the lecturers. This involves the economy of the program!

The questionnaire is attached as enclosure 3. The answers are very much the same as in 2009. The lecturers were glad to participate. They actually found it rewarding in many ways to communicate with children of 12 – 13 years. It would be profitable if we found the means to prepare the lecturers pedagogically. The same as in 2009 especially the wish of the lecturers to be better equipped to cope with our age group.

### *3.2.4 Conclusion*

SKUB was a success!

The program needs improvement in

**Content:** more practical work and less theory

**Presentation:** fewer words, fewer technical terms, things to see and touch

**Preparation:** the experiments, activities and projects electronically accessible to the teachers should be discussed thoroughly in our planning group and revised.

We must meet with the lecturers before the program starts.

**Organization:** the practical program should be investigated and tightened up in different places.

Although we changed some things according to our experience in 2009 there is still the need to continue improving our program and the qualifications of the lecturers.

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### 3.3 London

Questionnaires were distributed to teachers and pupils for both programmes. The teachers' questionnaire explored pupils' enjoyment of and interest in each event, accessibility of the presentation, suitability for the age group, whether it increased their understanding and if it related to subject learning at school. Responses were received from sixteen of the schools attending.

The seven events (one plenary lecture for all pupils on climate science, one of two workshops on 'energy and behaviour' or 'arctic expedition') in the morning, and two of four events in the afternoon (making a model solar house; making a blade for a wind turbine; capoeira dancing, and food and energy) were evaluated individually by each respondent. The day of the session attended was noted, in order to check for the impact of any changes in presenters for particular sessions.

It is apparent from the attachment that pupils enjoyed almost all the events, the exception being 'arctic expedition' where three of the eight did not. From teachers' comments, this appears to be because there was too little time to get the balance between showing the film and developing the mime activity. Clearly, the 'hands-on' events in the afternoon where children were involved in making things or dancing, were more popular, which suggests more such work with smaller groups for the final two programmes.

One important finding that is being followed up is that for the sessions as a whole a the ratio of responses agreeing that total of 79 responses to the question exploring whether the events were related to subject learning at school, 58 responses agreed that they were, but 21 responses stated that they were not. This is, we understand, an indication of the different levels of take-up of climate and energy issues in individual schools, as the overwhelming majority thoroughly enjoyed their day and agreed that pupils' understanding had been increased.

Asked whether the programme met teachers' expectations, seven answered that it more than met their expectations, fourteen that it met their expectations and none that it did not meet their expectations. Twelve found it very useful, seven 'mostly useful', one 'partly useful' and one 'not at all useful' (cf. tables below). The latter two teachers, who teach at the school closest to the University, got lost on the way in and arrived over an hour late, so did not get the full benefit.

The qualitative responses of the teachers and the pupils' questionnaires are the subject of continuing analysis, but we will be making some changes in size of group, length of session and content on the basis of the questionnaire survey. Teachers returning for a second year commented on how much we had improved the programme, but we plan to introduce one or two new, interactive 'gaming' sessions for the fourth programme.



## 1. Your observations of PUPIL ENGAGEMENT at each Event you attended?

a)	Morning		
	Climate Science Lecture	Energy & Behaviour (CAT)	Arctic Expedition
Enjoyment	20 yes 1 no	12 yes 1 no	5 yes 3 no
Interest in topic	12 high 9 medium 0 low	7 high 7 medium 0 low	1 high 4 medium 3 low
Presentation / approach	21 accessible 0 not accessible	11 accessible 0 not accessible	5 accessible 3 not accessible
Content suitable for age of pupils	4 older 17 ok 0 younger	0 older 13 ok 1 younger	4 older 4 ok 1 younger
Increased their Understanding	17 yes 1 no	11 yes 2 no	7 yes 1 no
Related to topic / subject learning at school	12 yes 5 no	10 yes 2 no	4 yes 3 no

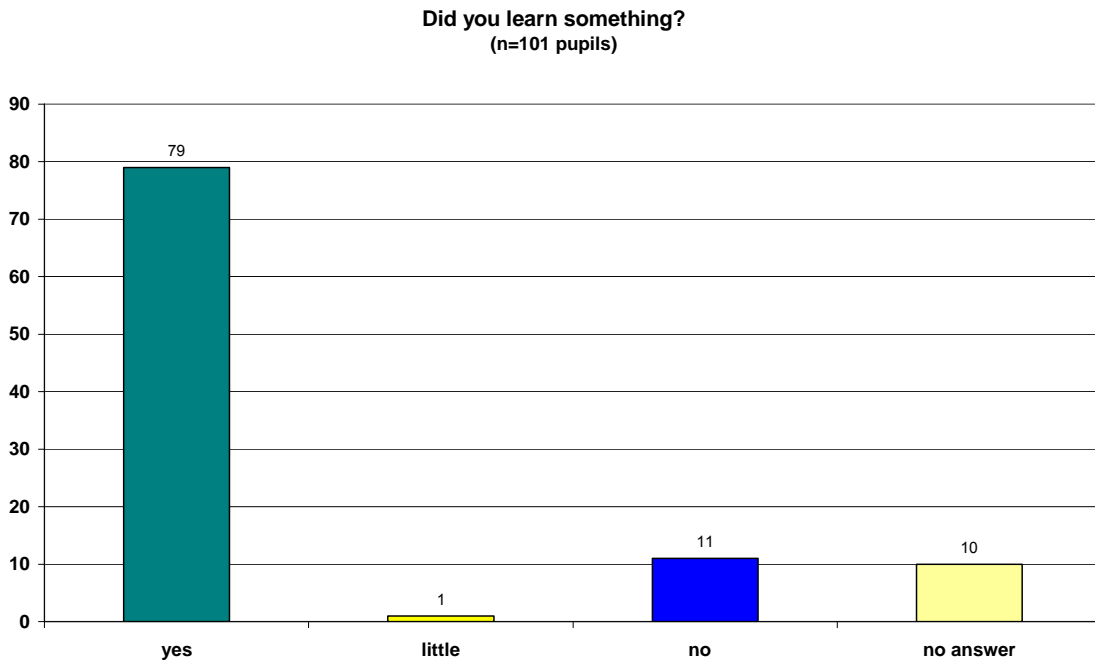
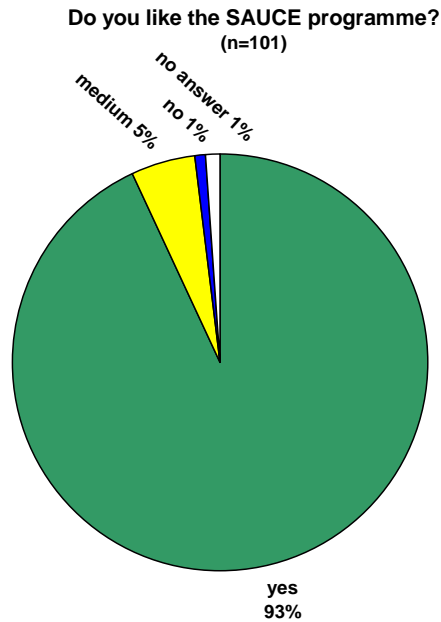
b)	Afternoon			
	Solar House	Wind Turbines	Dancing (Jinga Capoeira)	Food & Energy
Enjoyment	15 yes 0 no	9 yes 0 no	10 yes 0 no	6 yes 0 no
Interest in topic	11 high 5 medium 0 low	8 high 1 medium 0 low	9 high 1 medium <input type="checkbox"/> low	6 high 1 medium <input type="checkbox"/> low
Presentation / approach	15 accessible 0 not accessible	9 accessible 0 not accessible	10 accessible 0 not accessible	6 accessible 1 not accessible
Content suitable for age of pupils	0 older 15 ok 0 younger	0 older 9 ok 0 younger	0 older 11 ok 0 younger	0 older 7 ok 0 younger
Increased their Understanding	13 yes 2 no	7 yes 1 no	10 yes 1 no	5 yes 1 no
Related to topic /subject learning at school	10 yes 5 no	8 yes 2 no	6 yes 4 no	8 yes 0 no

### 3.4 Germany

#### 3.4.1 Children

The results shown in the diagrams support the general impression gained from personal exchange with teachers and of the team. They show that the program is very much liked by the children, that most children have the opinion that they learned something new and most would like to attend again. However, as in the 2009 survey, these results should not be overestimated, as some of the children apparently copied

the remarks of their neighbours or might have felt inhibited by the overall situation, leading them to be uncritical. The low validity of the data to be collected through this type of survey, the comparatively large effort and the lack of time teachers and their classes often have after the workshops are over, are the main reason why the survey by questionnaires was limited to a low number of total children participants.



Would you like to attend the next SAUCE programme?  
(n=101)



The generally positive response of the children was supported by the impressions team members noted down when sitting in the workshops. In only five of the 17 workshops some of the children were described as “noisy”, in all of the 17 workshops the children were described as interested or participative, or both. Only one of the workshops was described for some of the children to be too demanding (because the lecturing part was too long, thus it was demanding on the children’s patience and ability to listen).

Generally, the results of the 2009 survey were supported by the 2010 survey. The pupils’ own practical participation as in experiments or games and the opportunity to take home a self-made product are very much liked. The lecture formats are seen more critical, particularly if the children are forced to remain passive listeners. But as long as lectures allow for participation and dialogue, the children also approve of these. Furthermore, fascinating or exceptional personalities presenting the children with an authentic personal story or experience expand the pupils’ attention span. If provided with the right participatory mix, the children get highly involved in and often inspired by the subject dealt with, revealing creativity and capabilities, in thinking as well as in a practical sense.

The master thesis presented by Bianca Adami, student member of the SAUCE team at Freie Universität Berlin, provides some interesting insights in the effects of events like the SAUCE program on pupils. For the underlying investigation, 10 pupils from two different schools were interviewed using open interview techniques. The aim was to identify long- or mid-term effects on environmental knowledge, consciousness and willingness to act. The children had participated in the workshop “climate breakfast” and were interviewed five month after the SAUCE program week. In the meantime, the topic had not been taken up again at the two schools. The investigations results showed

- That the issues of climate change and energy as such are known to the children because they are part of the common discourse at school and in the media.

- But that the children upon being asked by the interviewer were not able to explain or recollect the basic facts or terms about climate change (greenhouse effect, CO<sub>2</sub>, etc) which had been presented to the children in the course of the event. Thus their abstract factual knowledge had not been expanded by the visit.
- That they did have a clear opinion and even intention with respect to personal activities with regard to food choices and the environmental qualities of regional, seasonal and organically grown. This had even motivated some to try to change their families' shopping routines.
- That after the emotional level had been touched in the interview, the children were able to explain some context-related facts about climate change and energy, such as the interrelation between long transportation routes and high CO<sub>2</sub>-emissions.
- That increasing the level of environmental knowledge did not show to be a precondition for increasing the level of environmental consciousness.

Thus, the effects of the visit at the workshop of the SAUCE program may be identified primarily on the emotional level, which had been influenced by the event. The abstract factual knowledge was not improved, but linked to the emotional level related facts were recalled. In conclusion, the children's preference for participatory formats with experiments and other hands-on activities which address them at an emotional level is complementary to these results. In contrast the transfer or "teaching" of pure facts in and of itself is boring to them, and due to its incidental character does hardly improve their factual knowledge.

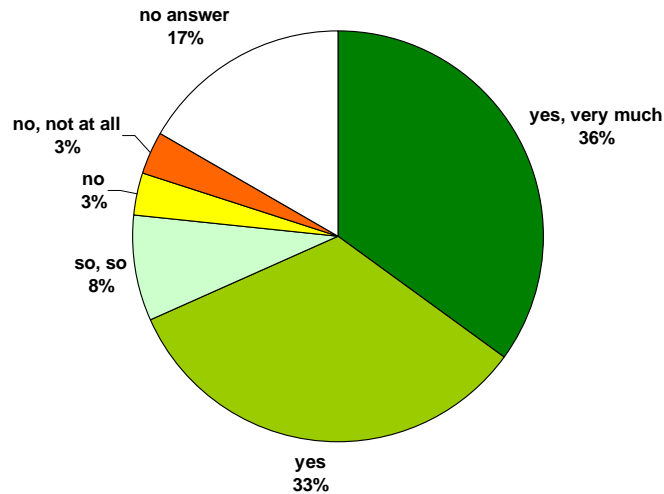
#### *3.4.2 Teachers*

The survey shows that the **organisation** of the program has been received overall positively. Initial difficulties which arose during the first programs have been largely solved and generally organisation and registration runs smoothly and to the teachers' satisfaction (see diagrams below). The internet based registration with the possibility of subsequent personal contact to teachers has proven to be very effective even if it involves some staff hours. It allows to accommodate the need to give preference to teachers participating in the info meetings and the particular communication needs which arise from the characteristic of some of the workshops offered or in case of cancellations. As a consequence, even late cancellations can be replaced by substitutes and the number of no-shows has been restricted to a minimum. The transparent registration principles (info meeting participants are served first and first come first serve), and the well-organised structure of the overall program have been pointed out by participants as important and highly valued features of the Berlin SAUCE program.

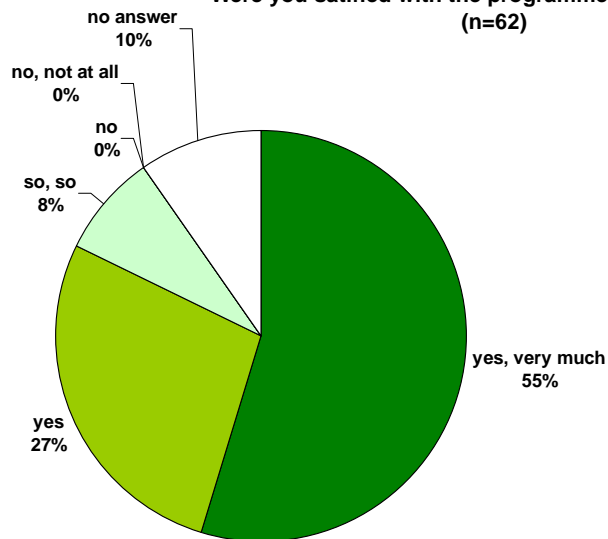
In contrast to the first two runs, the rooms and lecture halls accommodating the third and fourth SAUCE program were located in very close vicinity from each other and close to the organiser's own office. This allowed an uncomplicated transfer of classes from workshops to lecture halls and the majority of participating classes were able to try out the pedal powered film show installed in the lobby to the lecture halls during the fall program. Furthermore, the locality's large and pleasant entrance hall and the free space around the buildings allow the children to move and play between events. Furthermore, the addition of excursion sites on campus to the program (campus energy tour, workshops at the meteorological station and the botanical gardens) has been very much welcomed.

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Were you satisfied with programme registration?  
(n=62)



Were you satisfied with the programme's organisation?  
(n=62)



Also the **program content** and workshop quality as well as the speakers have been regarded positively by the teachers. In comparison to the first program runs, the number of participants in lecture formats was limited to a maximum of 120 children, in some cases to 90. This has had very positive effects on the quality and the children's level of concentration. A number of teachers did have suggestions for improving the methodology of some of the workshops or lectures. Most frequently named were

- increased room for the children's own activity and participation, including experiments,
- increased adaptation of the content matter to the specific knowledge of the children present,
- the need to draw the relation to the children's daily lives.

Consequently, those workshops and lectures which fully respected these aspects have been most positively judged. This worked particularly well also with some formats new to the 2010 program: workshops employing creative arts as the principal tool for getting the children personally involved and reflect on the subject (e.g. through creative writing on climate change or making sculptures from plastic wastes). These were very well received both by teachers and pupils, visible also in the variety of sculptures and texts created.

Diagram: **What do you like about the SAUCE program?**

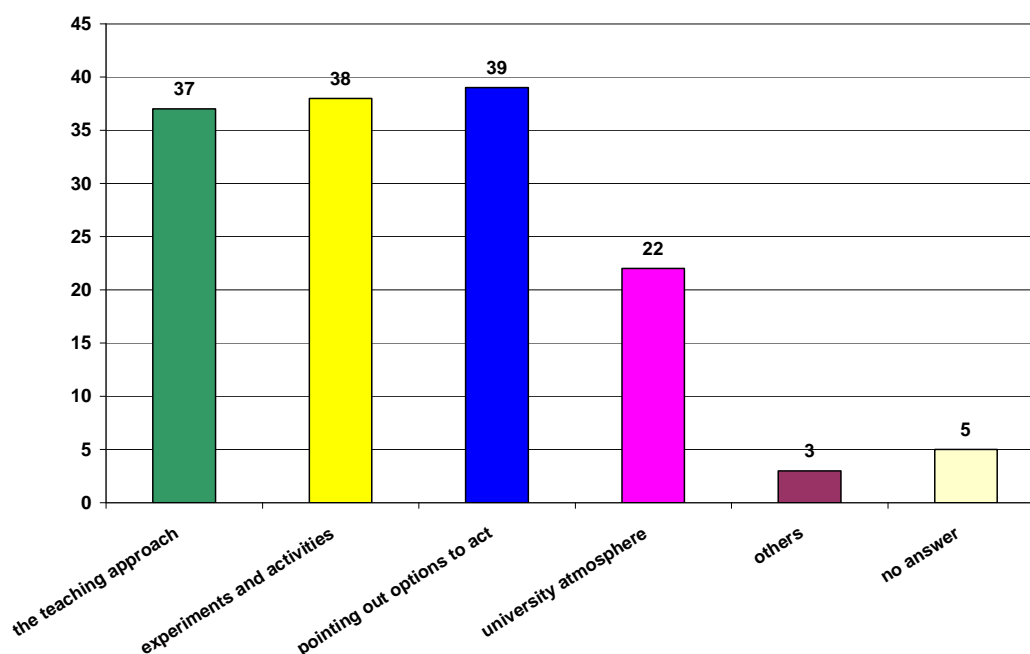


Diagram:

**Are you satisfied with the methods applied?** (n=60, one answer on a scale of 5, with 1=yes, very much, 5=no, not at all)

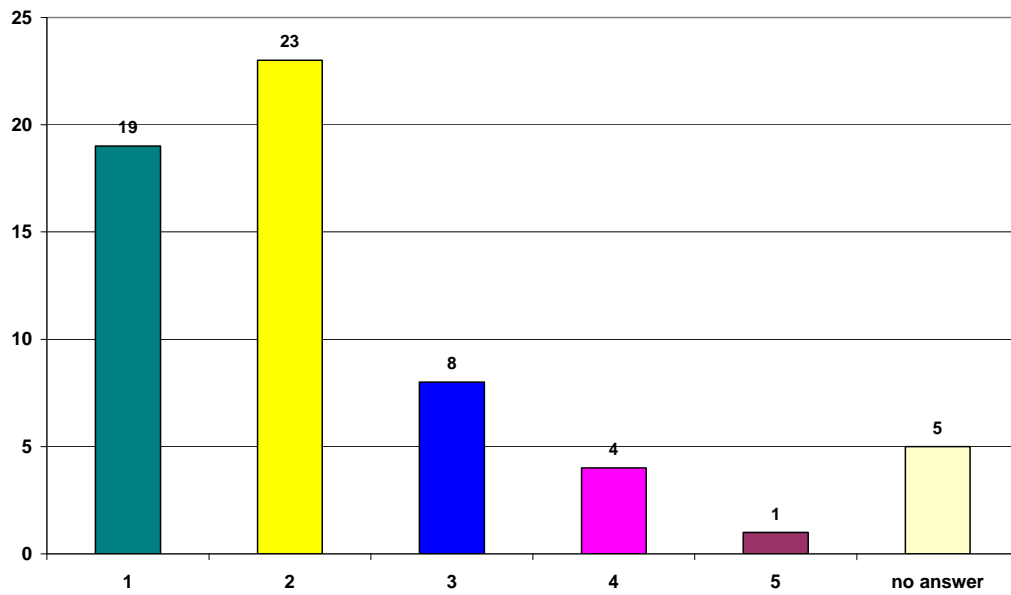
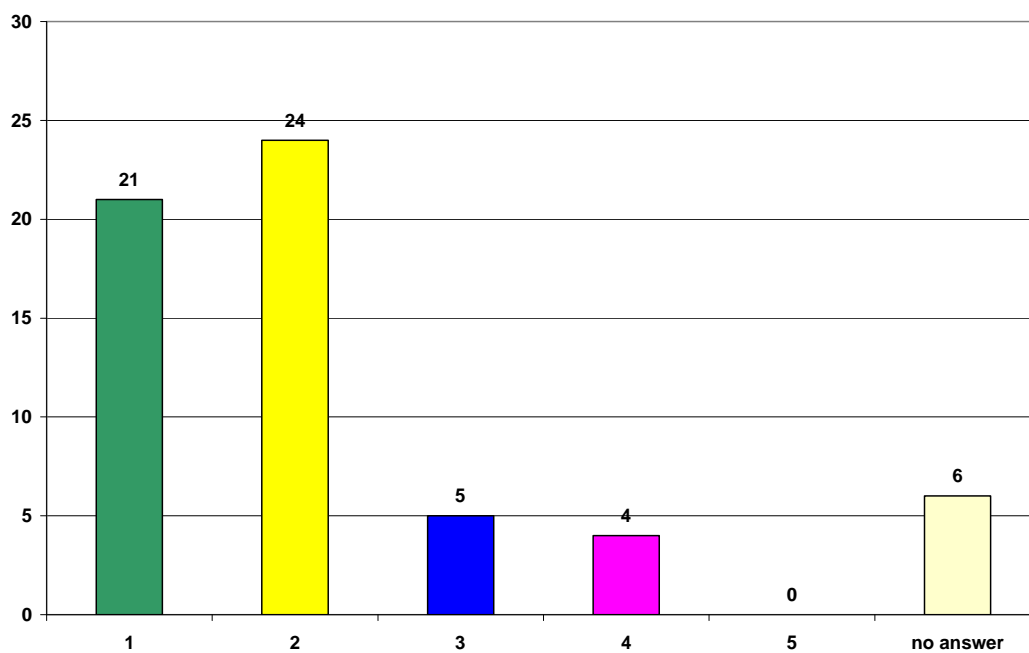


Diagram:

**Are you satisfied with the lecturer?** (n=60, one answer on a scale of 5, with 1=yes, very much, 5=no, not at all)



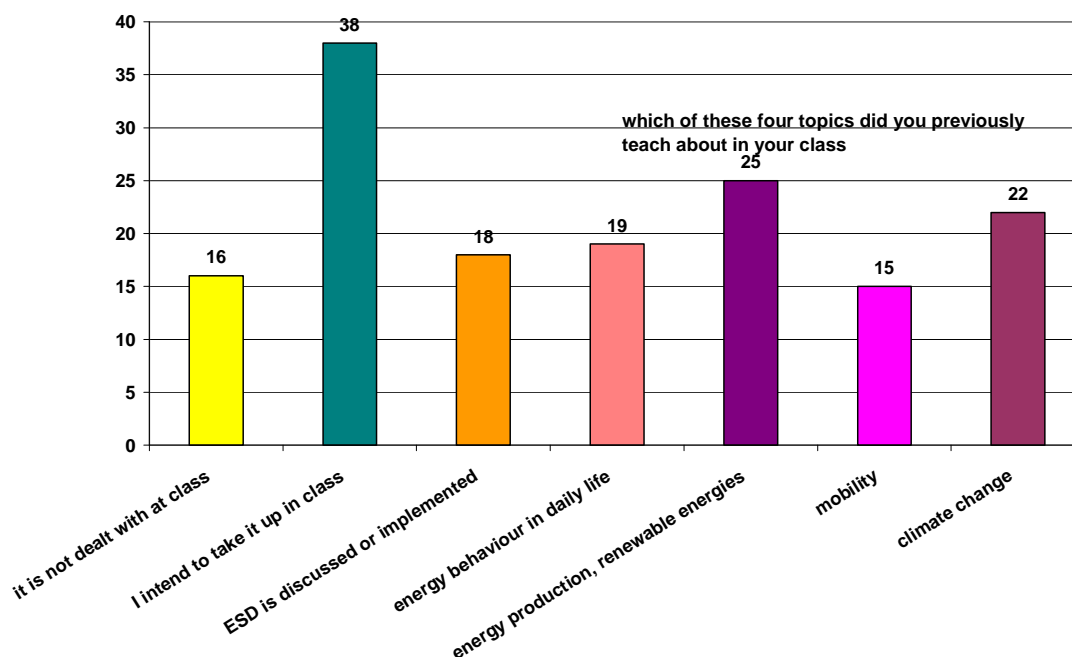
The 2010 survey also intended to get an insight into secondary effects of the SAUCE program on pupils and on the teaching routines. Therefore, the questionnaires also inquired into the subjects dealt with at school prior and/or after the class's participation in the programs. Furthermore, teachers were asked to describe the activities undertaken to communicate about the program's content and their class's activities within their schools.

Results from the survey during the program shows, that a majority of teachers already integrates a number of topics in their curriculum teaching or plan to do so (cf. Diagram). However, it has proven to be difficult to survey the secondary effects at school after program participation due to the low response rate. The few answers received indicate that

- teachers personally exchange with individual colleagues about the program
- take up methods presented at the program
- plan to take up a range of topics further on in the school year.
- plan to visit further out-of-school programs.

Diagram:

**Integration of the topics in your teaching at school** (n=60, multiple answers possible)



It is impossible to draw any conclusions of the general causality of these answers from the survey results, also because the Berlin SAUCE program has not been the only offer to schools of the region on the subject of energy and climate. But incidental results from personal exchange with teachers and speakers do underline the overall impression that the SAUCE program has become an important and highly valued element in the teachers' strategy to integrate the subjects of energy and climate in their teaching.



In their strategies, teachers regard out-of-school teaching sites, like the SAUCE program, as important resources. They do so less because the pupils learn important new facts (in the sense that the pupils knowledge is increased in a sustainable way), but much more because the pupils personally identify with the subjects much more easily. They do so as a consequence of their participation in an out-of-school event with different “teachers” approaching the children in an unbiased and non-judgemental way or just in a manner different to that of their school teacher. It takes place in an exciting and new environment and often allows the pupils to do things impossible to do at school. This personal identification in turn enhances the effects on pupils of subsequent teaching on these subjects at school. Thus, teachers highly value the positive emotional effects a visit at an educational site like the SAUCE program may have on the pupils. In contrast, the task of teaching the facts touched upon at the program in a didactically sound sense is regarded to remain the teachers’ responsibility.

In the German schooling context, the opportunity to visit out-of-school educational sites has become a common and frequently used opportunity to supplement curriculum teaching. According to the teachers interviewed, these opportunities are particularly highly valued if they are offered by institutions which are independent from economic or political interests and if their program is offered on a continuous basis and at reliable quality.

#### *3.4.3 Lecturers:*

Generally, lecturers are very much interested in getting feedback on their performance and concepts. Their interest to communicate with the teachers seems to be much higher than vice versa. There are numerous teachers who willingly take up the ideas and topics and enquire for additional material from lecturers or educational actors. At the same time, many others prefer to leave it at the workshop visit itself and arrange for additional teaching at school on their own and independently from the lecturers or support form outside schools whenever the context and curriculum allows for it.

#### *3.4.4 Volunteers/organizing committee*

In comparison to the experience of 2009, organising the program and logistical tasks has run smoothly and routinely. Very valuable was the decision to use buildings in close vicinity to each other. This substantially decreased the general effort needed, because distances were close and, if needed, office equipment and additional helpers were quickly at hand. Furthermore, the university’s technical support service by now is well informed about the program and acquainted to the particular needs.

The internet registration platform has been connected to the event registration tool available at the university which made it much easier to upload and change the needed information on the website. With one additional manual checking mechanism, errors in enrolment have been reduced to nearly nil. Even though the two week registration period does involve some manpower, also for personal communication with teachers, the system has proven to be effective and, as mentioned above, is highly regarded by teachers for its reliability. Thus, it has the positive side effect of getting in personal contact with the target group allowing informal exchange.

### *3.4.5 Conclusions*

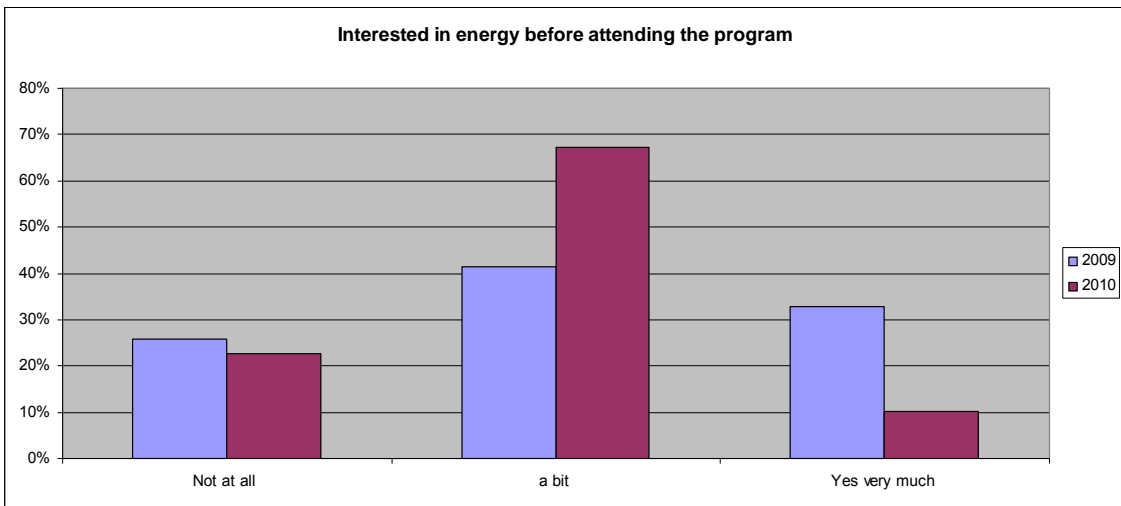
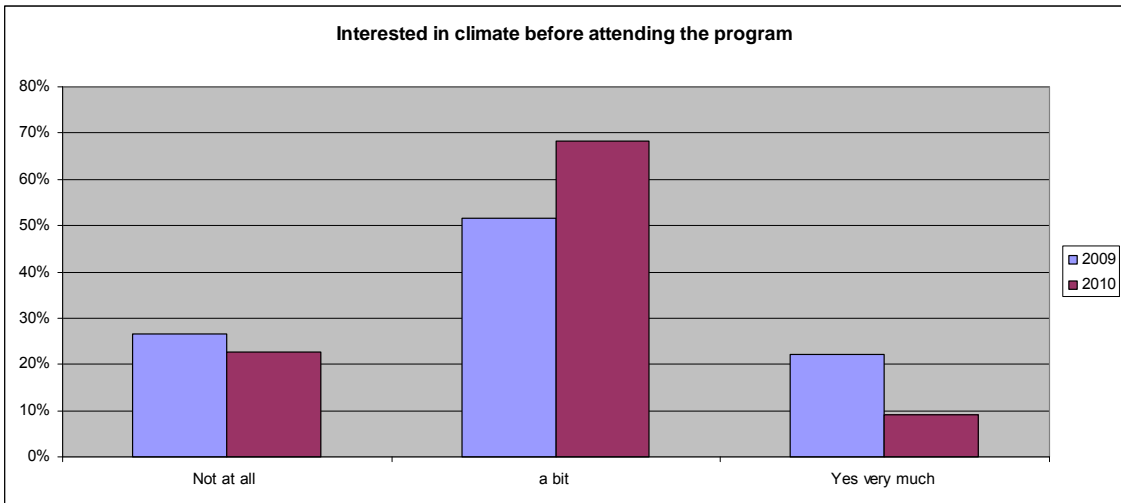
In conclusion, the Berlin SAUCE program revision has taken regard of most of the conclusions and suggestions for revision drawn from the 2009 evaluation. After the completion of four program runs, it seems to have become an accepted and valued option for out-of-school activities which teacher like to attend with their classes. The formats have been further adapted to take regard of the pupils' and teachers' request for participatory and exceptional activities. The improvement of quality of content and organisation has been continuous and is reflected in the positive feedback from teachers. The adoption of more full morning program elements as opposed to the previous model of "one event only" has reduced the number of individual children who attend. At the same time, the total number of single events and total workshop hours offered has increased.

The newly added content has emphasised interdisciplinary and creative activities, which intend to address the children's senses and interests and cause their personal identification with the topic. The tentative results of the master thesis support this strategy, because it seems to be the environmental consciousness which is most easily affected by out-of-school events and which may then facilitate an increase in environmental knowledge and ultimately a change of behaviour.

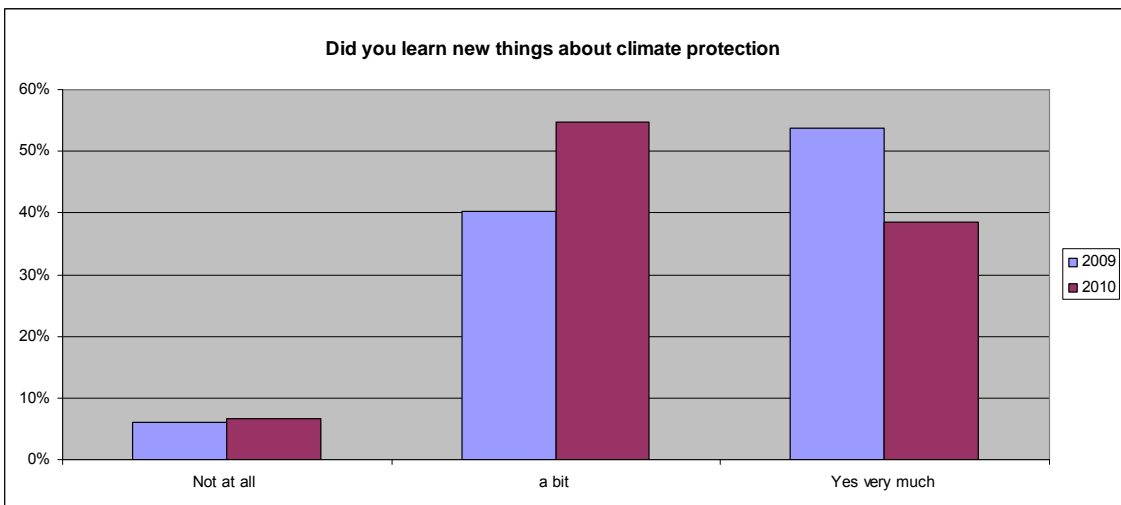
## **3.5 Twente**

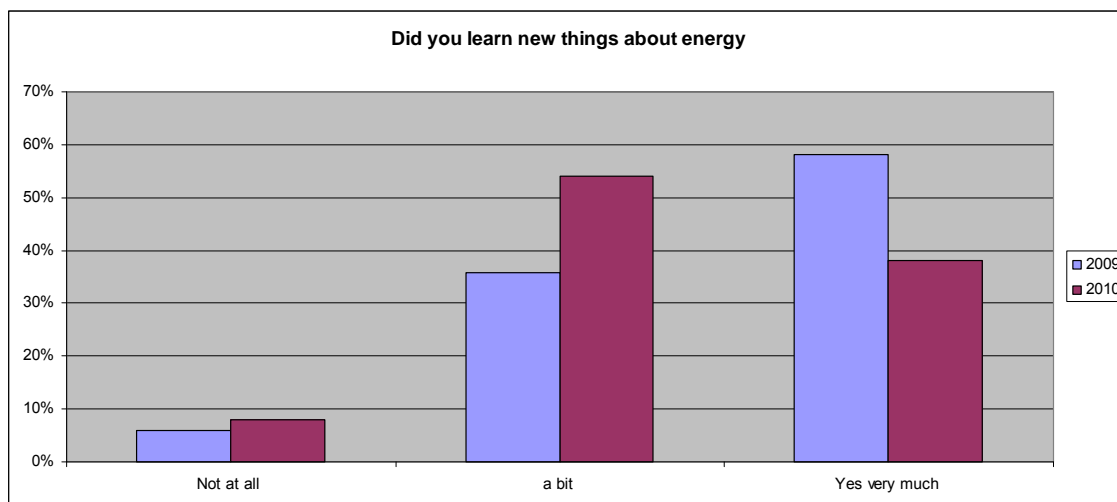
### *3.5.1 Children*

The rationale of the questionnaire for the children is to learn more about their perception of the program they participated in and how they processed the program content. For that reason they were asked if they were particularly interested in climate change and energy before attending the program. In the tables below it is indicated that in both years the children had only a bit of a notion of climate change and energy. Probably caused by the elementary preparation of their visit to the university and the SAUCE program (see also below the teacher survey). The number of children already interested in climate and energy before attending the program decreased substantially in 2010. One of the reasons for this change probably is the kind of classes attending the program. In 2009 we had several so-called „plus“ groups in the program, children with above average intellectual skills and capacities. Several of these groups prepared for SAUCE by means of special class activities focusing on climate and energy. The local coordinator of SAUCE visited one of the „plus“ groups after the 2009 SAUCE program to participate in their school activities. During the visit the special skills and capacities of the children showed in remarkable clever presentations of the children in all ages. In the 2010 program less „plus“ children compared to the number of other classes participated in the program. This is also reflected in the children's interest in the theme.



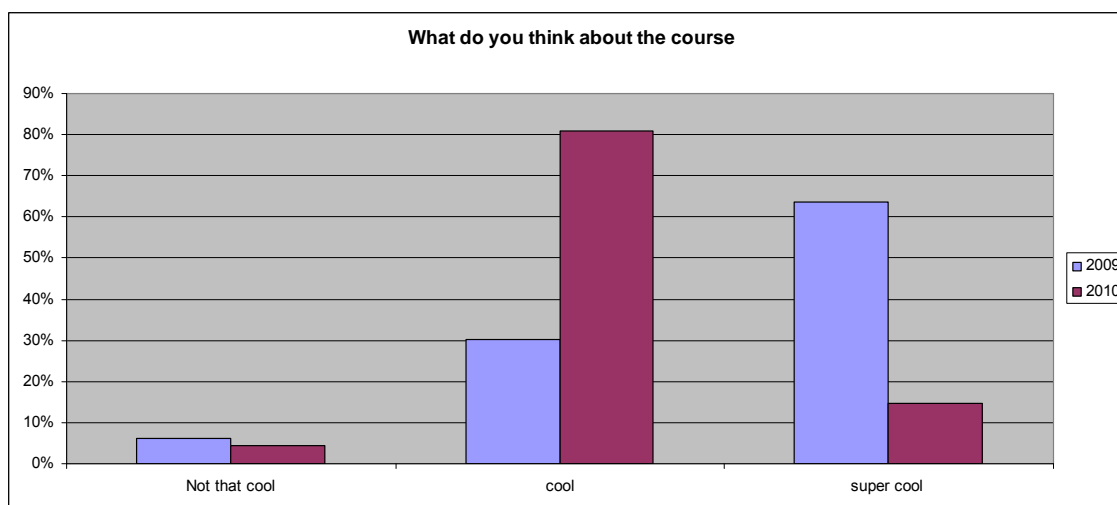
The children were also asked if they had learned new things about energy and climate protection. The next two figures compare the answers in both years.



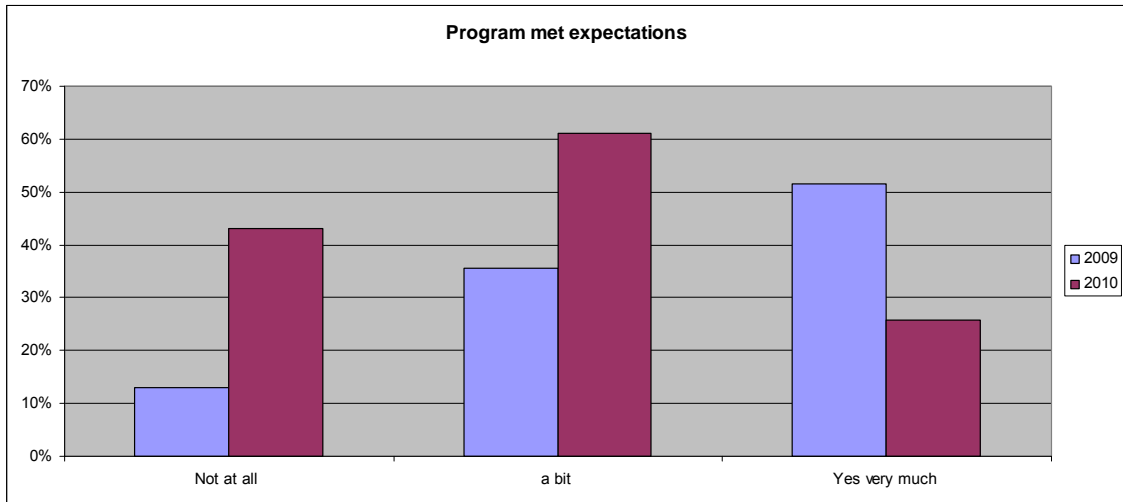


Again, the comparison generally shows that the highest category „yes, very much“ is less filled in 2010, meaning that the children indicate that they learned from the program, but only moderately. However, larger parts of the children indicate that they learned something new in the program, even though they were only moderately interested in the themes. This can be taken as an indication that the program manages to attract children’s attention for themes and topics discussed in the program. This finding is also reflected in the teacher’s survey (see below).

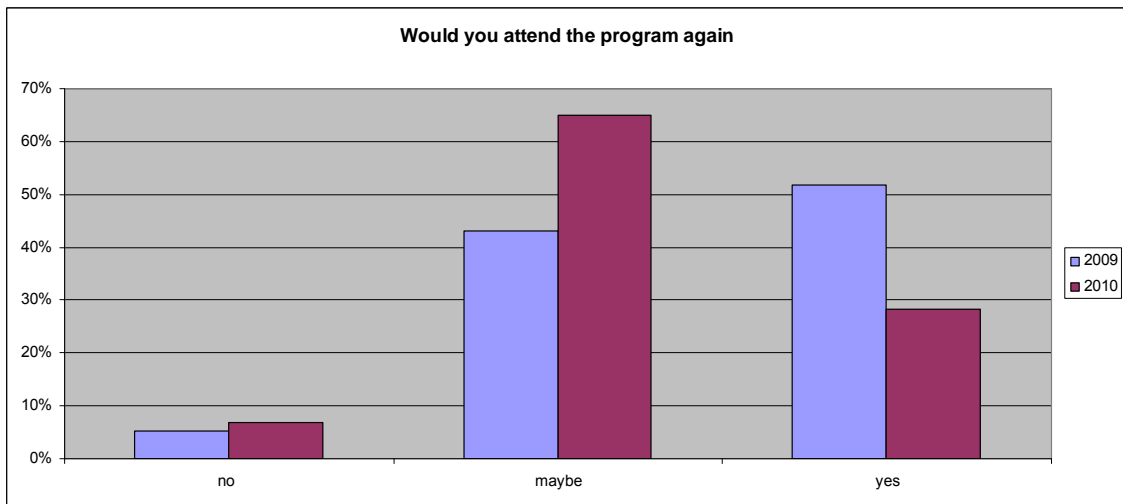
In a next set of questions we asked the children’s opinion about the activity they participated in. As showed in the next figure, most children found the course „cool“ in 2010 instead of „super cool“ as in 2009. In personal talks, children indicated that they found lecture rooms are like the big theatres and the university exciting. But we also noticed that children had no clear idea what a university really is. In 2009 children were more knowledgeable about the real meaning of a university as the highest level of education in the country’s educational system. In general we noticed less concentration in the 2010 attendance of the program compared to 2009. But in general the children liked the course they attended, which is also reflected in the minimal number of the children indicating that the course wasn’t cool at all.

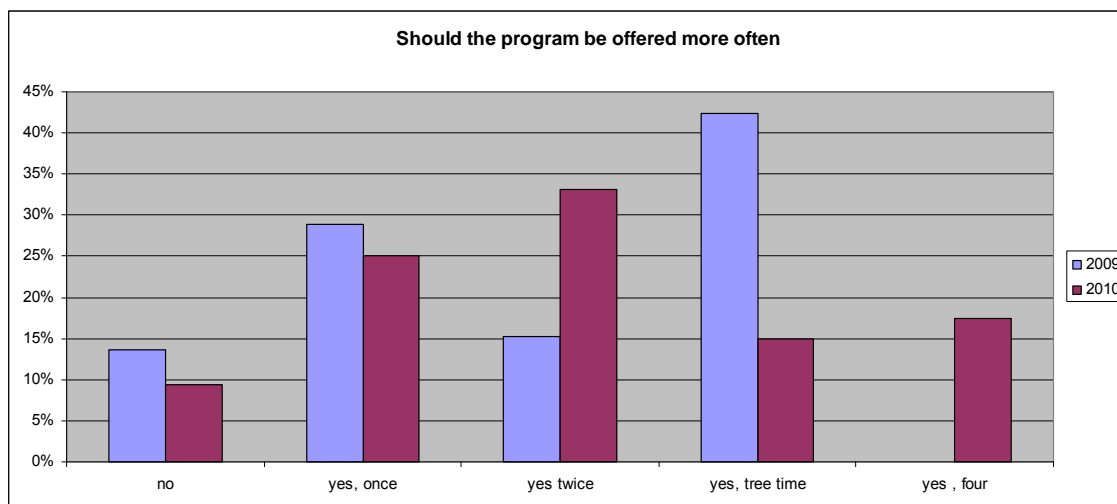


The next figure shows that the program did meet the expectations of the children, but less than in 2009. One of the reasons could be that the children attending the 2010



program had less expectation than the children attending the 2009 program. This corresponds with our general impression that the average intellectual level of the children in 2009 was higher than in 2010. The 2010 group was clearly less enthusiastic about the program and how it met their expectation than the group of 2009.

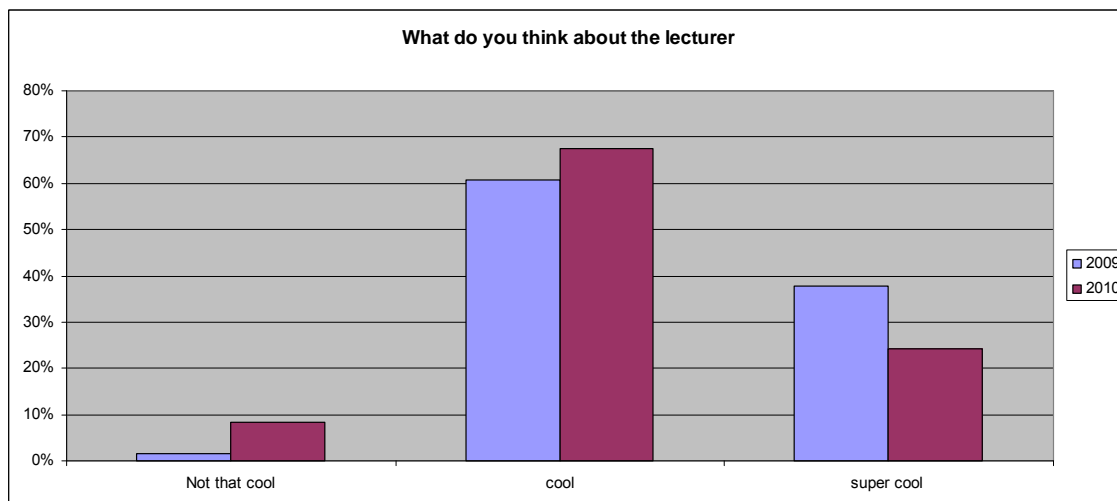




Another indication of the children's perception of the program is if they would attend the program again and the frequency of program deliverance. Here we can trace some inconsistencies in the children's response as both previous figures indicate. In 2010 most children were not sure if they would attend the program again and the group being sure about that decreased compared to 2009. At the same time in both years children plea for more programs a year, with some children suggesting up to four program runs a year. However, most of the 2010 group keeps it to two program runs a year, which is actually the frequency some of the SAUCE partners are delivering the program.

The majority of the children enjoyed the program and found it "cool" and interesting to have lectures at the University. However some pupils also raised the problem of the long distance and found the University too far away from their school. That point was also mentioned by some pupils as one of the reasons not to participate again at the SAUCE program.

Finally we asked the children their opinion about the lecturer of the program they attended.



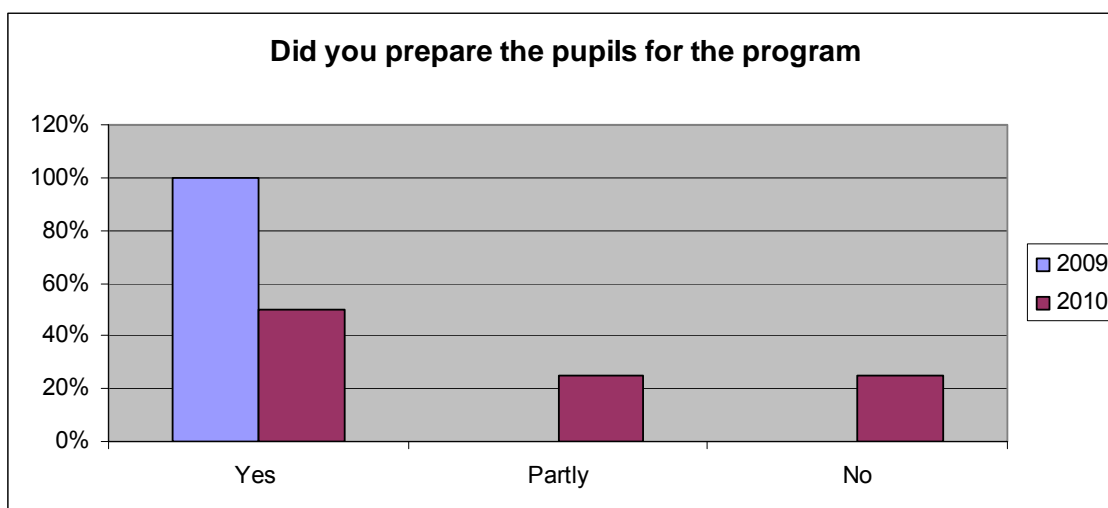
It shows that most children found the lecturers „cool“ and „super cool“ referring in the children’s perception that it was „okay“ the man or woman was offering. This result was confirmed in the break talks with the children and the teachers. In general the lecturers offering the SAUCE program did all well.

The results show that most children evaluated the program moderately. Most children chose the second response out of three. With regard to the program content and quality it shows that approximately 81 percent of the participants liked the course and/or workshop. A minimal number of the children indicated they didn’t like the program at all. Considering the learning effect of the program, more than half of the children stated that they have learned from the program.

### 3.5.2 Teachers

Like the children, we also questioned the teachers in both years with a questionnaire. The teachers filled in the questionnaire a couple of days/weeks after the program. The questions all aim at getting an idea of the teacher’s perception of the quality of the content, organisation, level and timing of the program. As with the children, we also talked to the teachers and the accompanying parents in the program breaks and before and after the program to get an additional impression of their findings. We only incidentally refer to the findings of these talks below. The findings of the teacher’s evaluation are predominantly based on the returned questionnaires.

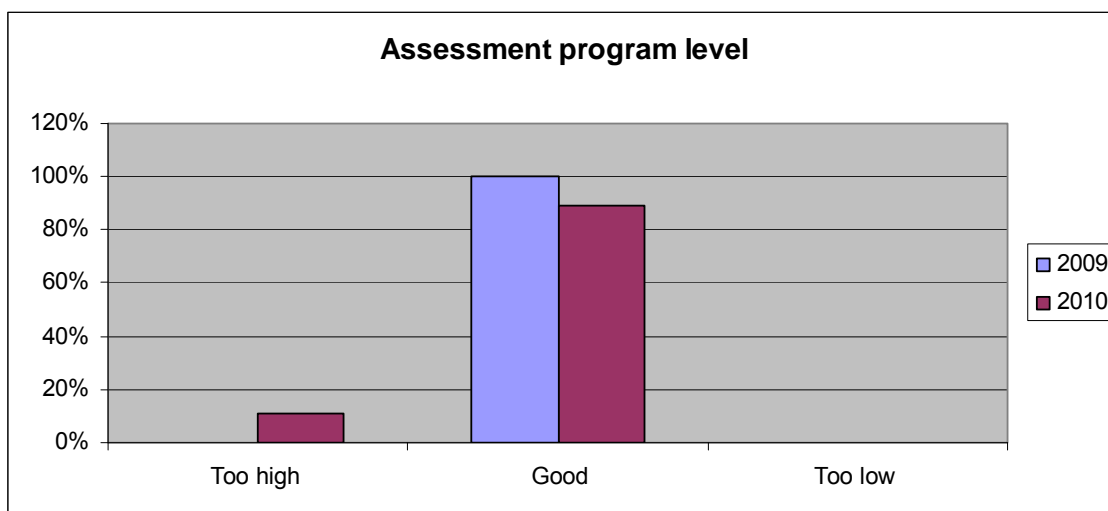
We started asking the teachers if they had prepared the children for the visit to the university and for the theme of energy and climate.



As the above figure indicate, in 2010 teachers not really prepared the children for the university and the program themes. The difference between 2009 and 2010 again can be explained that the teachers of the high intelligent pupils actively look for opportunities to meet the needs of their classes. In the talks with the teachers in 2010

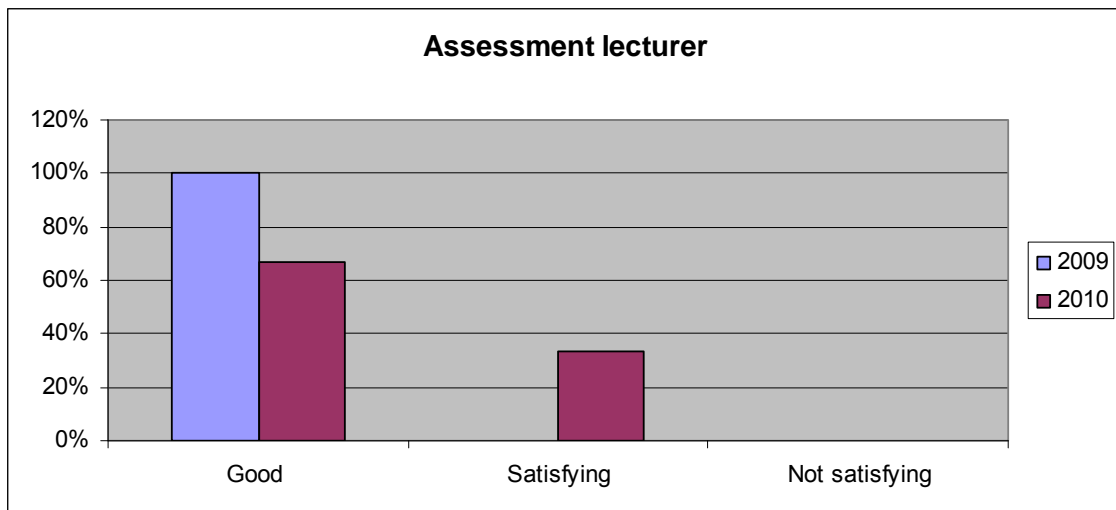
we were confirmed in the general idea that the regular school program hardly offers opportunities of preparation of teachers and children. Dutch teachers are fully booked over the year and they hardly have time for extra activities. So many of the teachers attending the program were fresh on the theme and the topic. Therefore it is interesting to see how they perceived the activities they participated in with the groups.

A next set of questions was to get an impression of the teacher's perception of the program content and program organisation. It is important to know if the program offered is at the right cognitive level for the children.

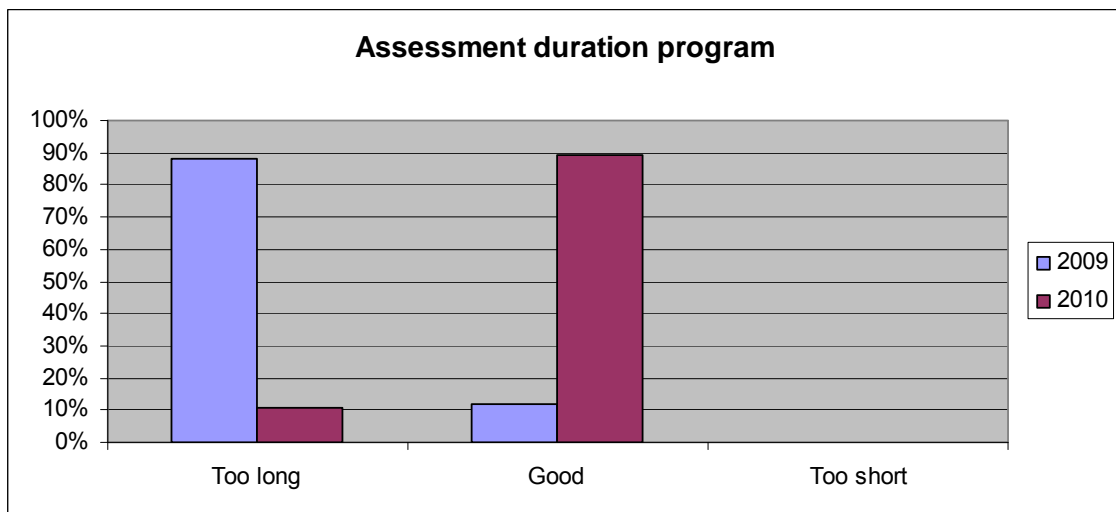


The above figure indicates that most teachers evaluated the program level as „good“, but in 2010 there was more doubt on the right program level. A few teachers though the level was too high and this is in line with our general feeling that the intellectual level of the children attending the 2010 program was less than of those attending the 2009 program. We haven't checked this assumption systematically, but it is confirmed by the teacher's impression of the level of the program and the degree of concentration of the children during the program. The intellectual level of the 2010 program deviated not significantly from the 2009 program. On the contrary, we had the impression that the increase of excursions and workshops and the inclusion of entertainment was good for the balance in the overall program between „head-heart-hand“.



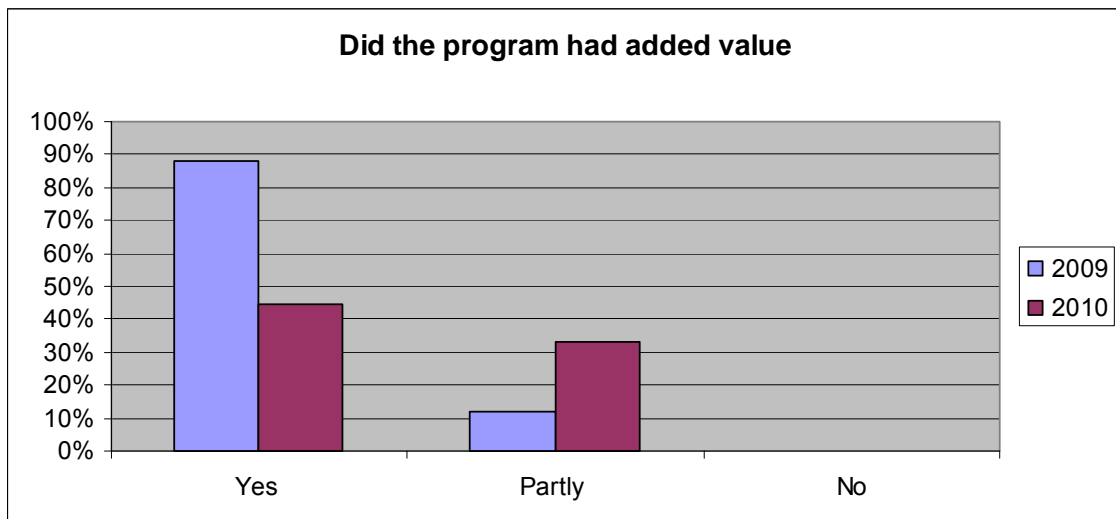
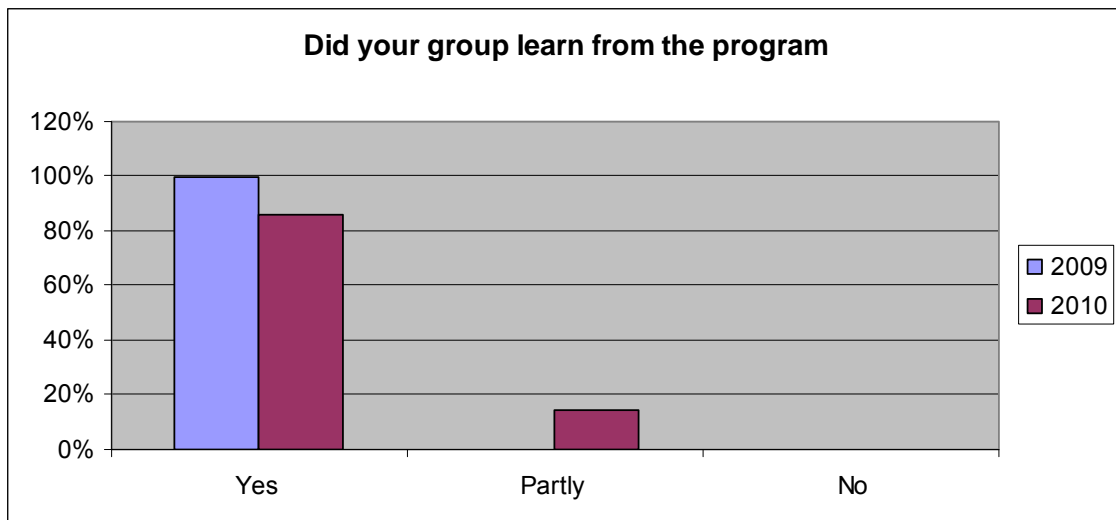


We also asked teachers about the performance of the lecturers and again, the perception is moderate compared to 2009, where all teachers thought the lecturers were good. Given the similarity of the content of both program runs, this finding again can be taken as an indication that the audience of the 2009 and 2010 program differed in cognitive level.

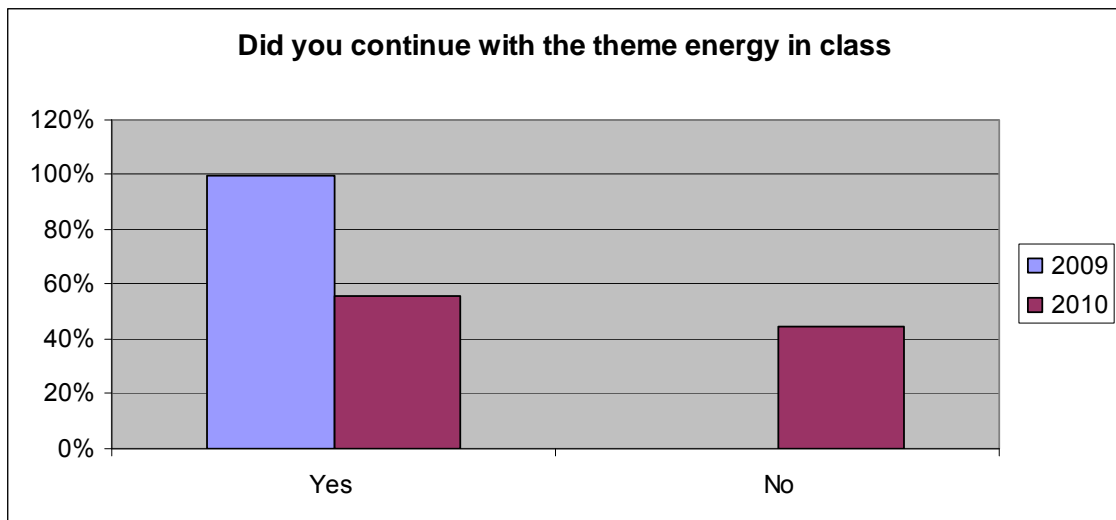


However, the teachers were quite unanimous about the duration of the program parts. In particular the 2010 courses were shortened compared to 2009 and this probably was a good choice given the perception of the teachers of the duration of the different parts of the program.

With respect to program impact on the children we asked the teachers if the children learned from the program and if the program had added value to the regular school program. The figures below show that most teachers have the impression that the children learned from the program and that the program has added value. In the

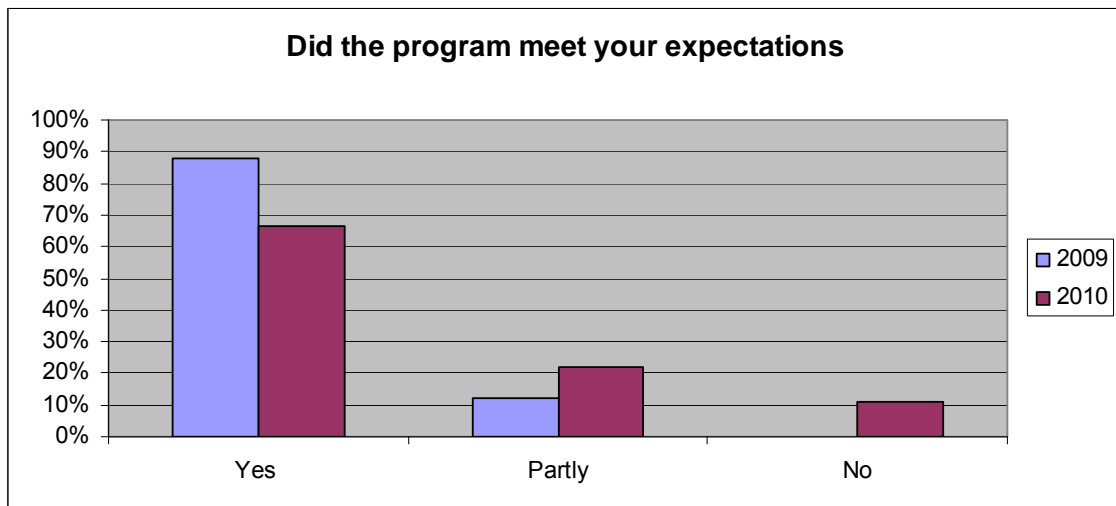


talks we learned from the teachers that the specific setting of the program, the university campus, is a stimulating environment for the children. The teachers also indicated that they never could have been so efficient in teaching difficult themes as climate change and renewable energy as the program does in one lecture, one day or in one program week. So in this way the program clearly has added value over the regular primary school program. The regular program of most schools hardly allows for cover of the theme of climate change and renewable energy.



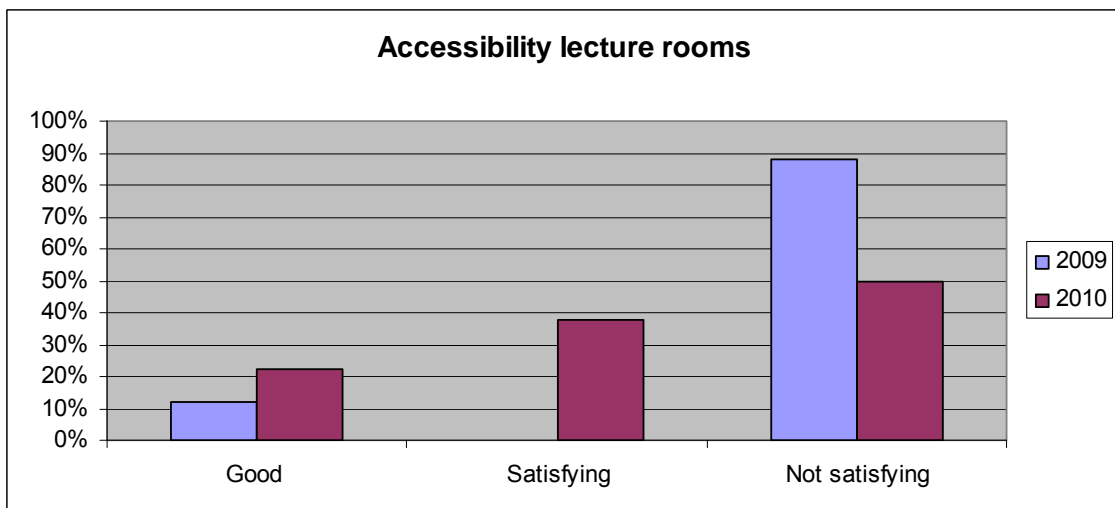
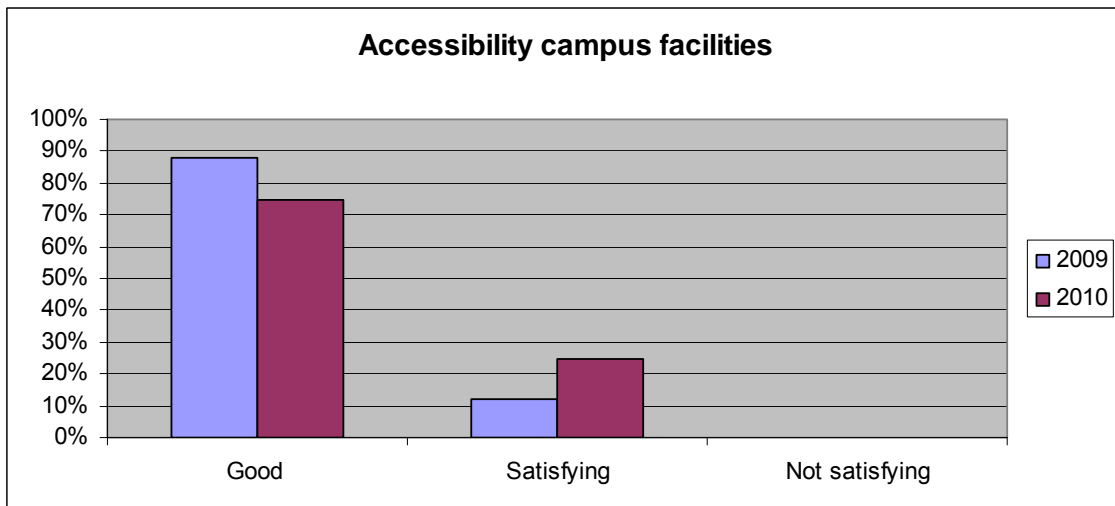
The above figure also confirms our assumption that the 2009 schools were more engaged in the theme energy and climate than the 2010 audience. In 2009 all teachers continued with the theme in their regular program, whereas in 2010 half did and the other half didn't.

We also asked the teachers if the program met their expectations. The figure below shows that this was the case, but that not all teachers were completely served as they expected.

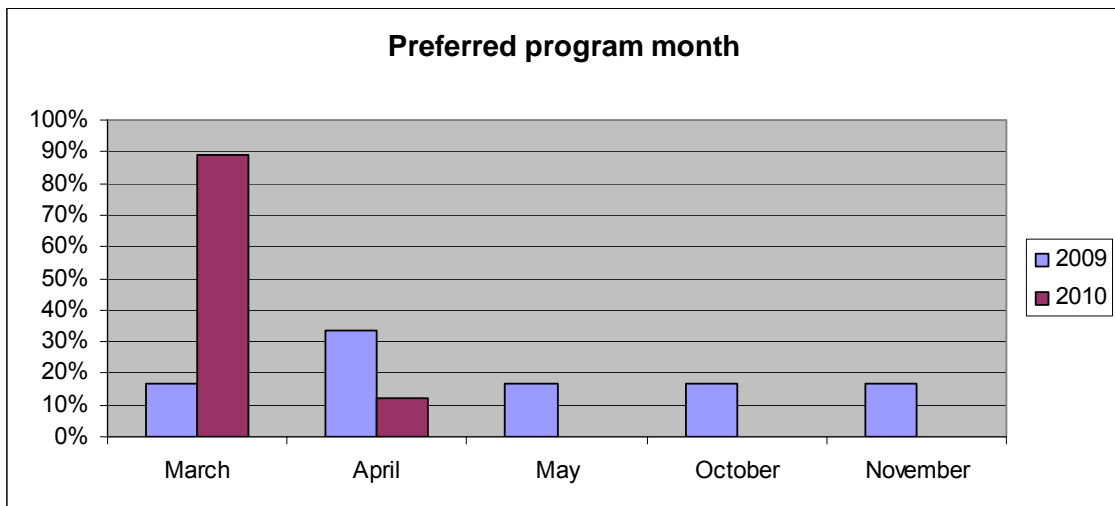
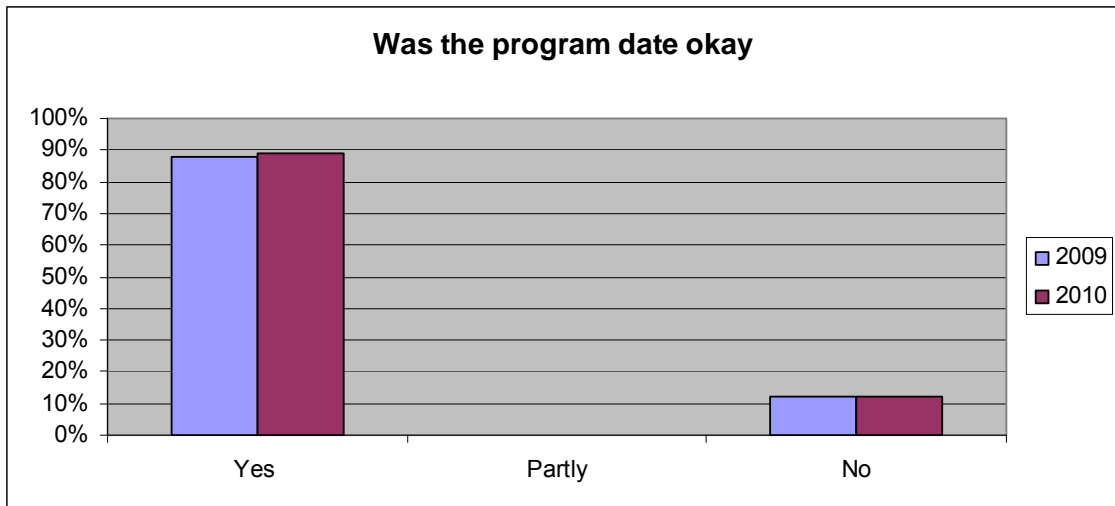


Next to program content and impact we also asked teachers about the organisation of the program. One of the things the Twente SAUCE team is facing is the reconstruction of the campus during the 2009 and 2010 program run, which burdened the accessibility of the campus and the campus facilities. Last year the SAUCE program was offered in one of the elder periferical buildings on campus and this year the campus roads were under construction. Despite all the discomfort on campus the teachers were not that negative about the campus facilities. They were facing more trouble finding the lecture rooms despite the new building in which we offered the lecturers and workshops. It is

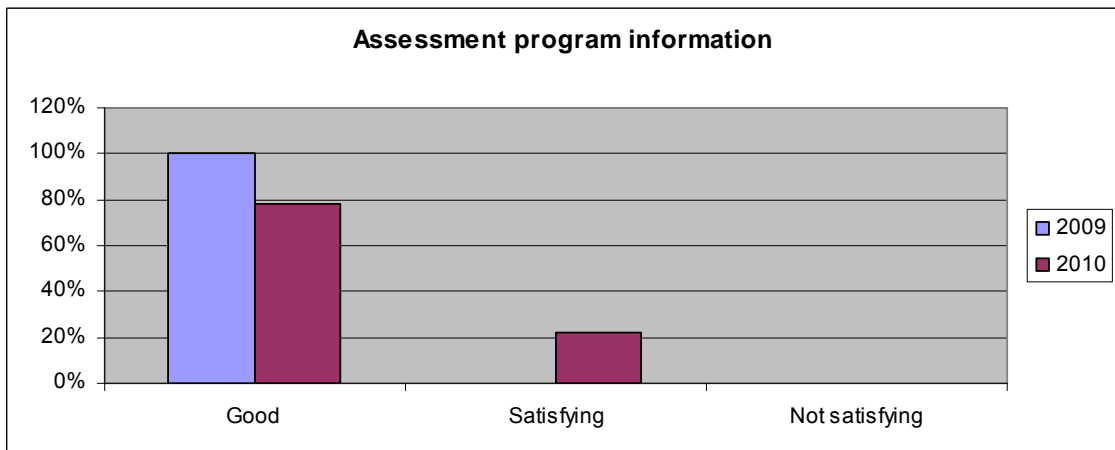
clear that the university campus is probably too big for teachers being used to moderately sized primary schools in provincial towns with moderate numbers of inhabitants. The SAUCE team did quite some additional routing on campus and in the buildings, but even then it was hard for the groups to find their way. In the final program run in 2011 we will anticipate this problem by special guidance of all attending groups. In this way we can also control group delays in lectures and workshops, which appears very frustrating for both children and lecturers.

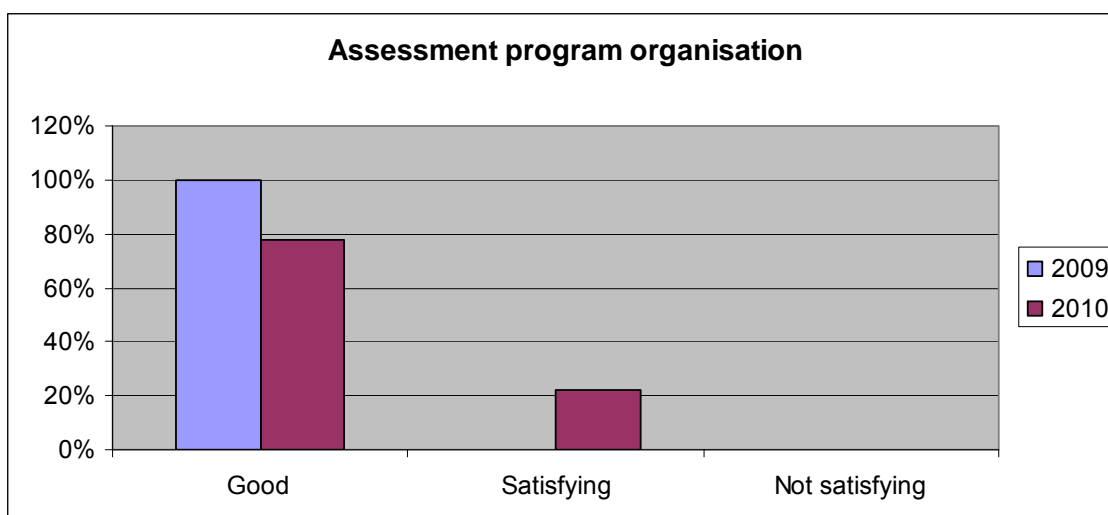


We also asked the teachers about the timing of the SAUCE program week in the annual calendar of the schools. The next two figures give results.



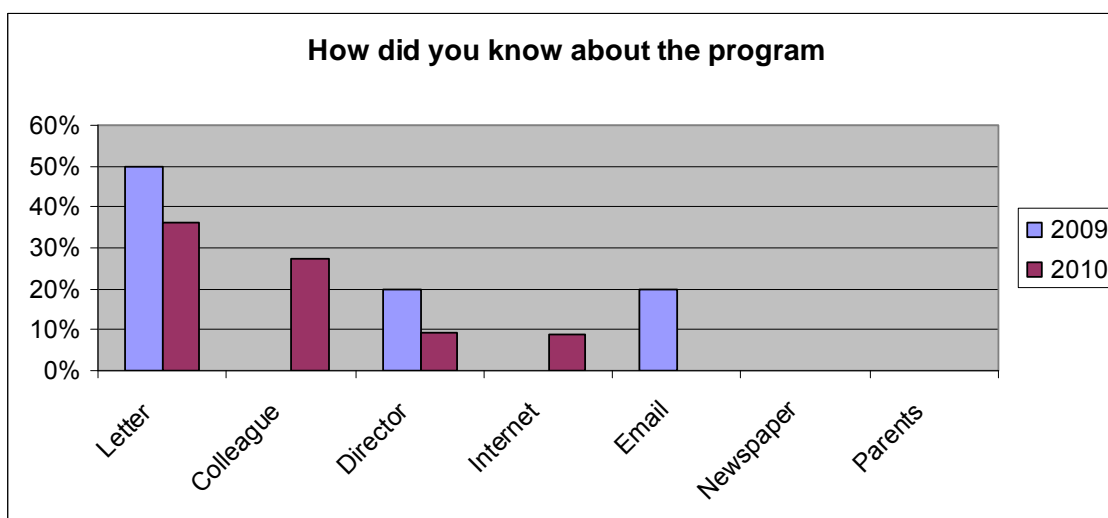
Both figures show that the program timing is okay according to the teachers but that most of them have a preference for March. We learned from the talks that March better suits the class program of the highest group of primary schools. These groups will leave primary school in June and this brings a lot of extra activities in the second semester. For that reason teachers told us that March would fit better than April. But as indicated, almost all were happy with April in 2009 and 2010.





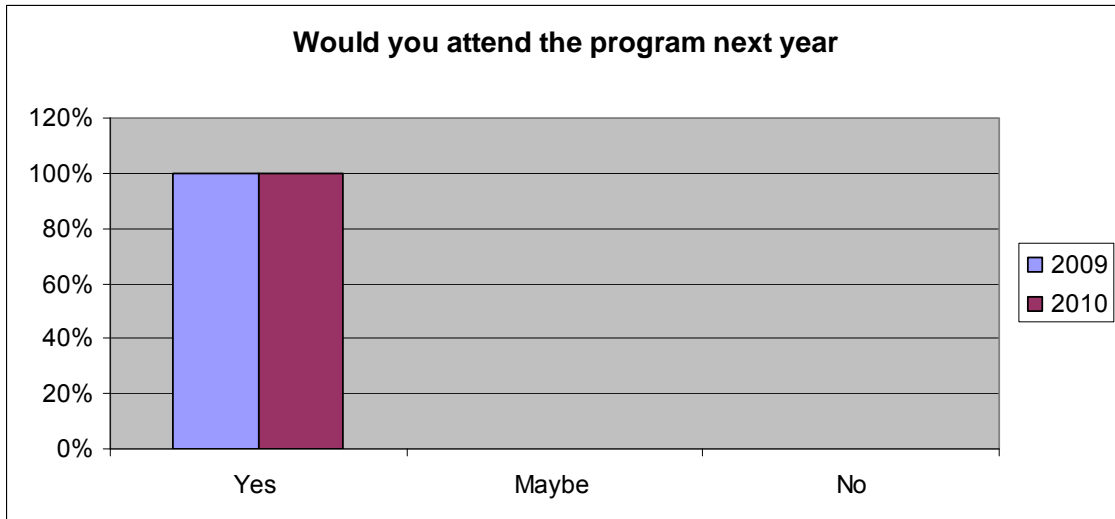
The same holds for the information we provided on the program and the accessibility of the program organisation. Every year our administration is facing a lot of information requests and the figures above show that in general teachers perceive our job as being done well. In the 2010 program we learned that the increasing numbers of attending children requires more staff during the program week. This lesson will be implemented in the 2011 program run with the help of volunteers.

The next figure shows how the attending teachers got informed about the SAUCE program. It shows that the website is only a minor source of information. It is definitely necessary to send direct mailing to the schools and to be as precise as possible in addressing mail. Most teachers get the information directly by the invitation letter or indirectly from the headmaster, who is also informed by a letter. It also shows that colleagues are a valuable information and dissemination source. Oral bilateral publicity seems to be an effective way to advertise the SAUCE program in Twente. This is also reflected in the annual increase of participating schools in the region.

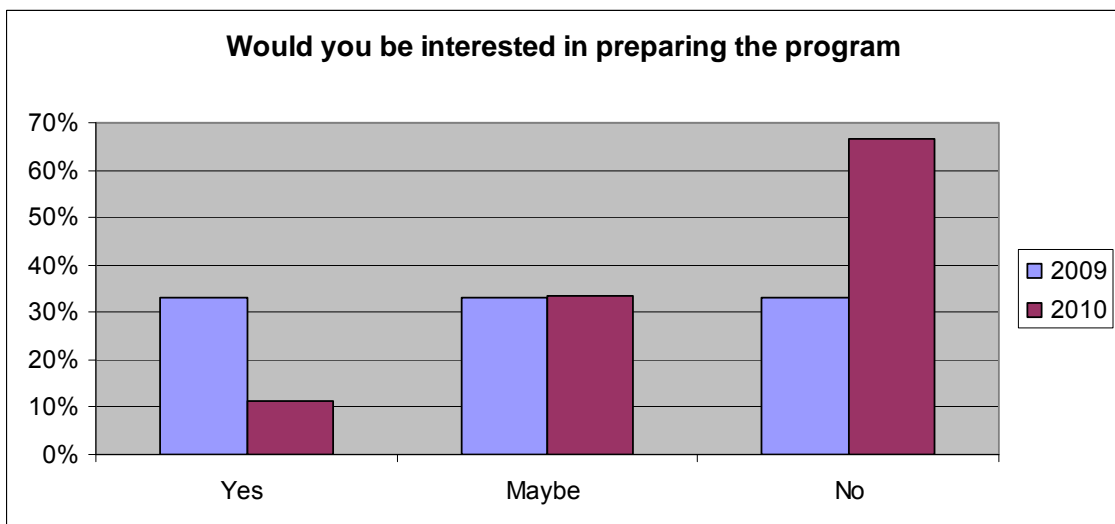


For most teachers the SAUCE 2010 program scored good as 67 percent of the teachers indicated that the program fulfilled their expectations. With regard to the program content and quality, almost 90 percent of the teachers considered the course level and duration as good. Furthermore all responding teachers indicated that the SAUCE program has a good teaching effect on the children.

The enthusiasm for the program in particular shows in the next figure where teachers indicate if they would attend the program again.



In both years the responding teachers are unanimous: they all plan to return the next year. However, we noticed in 2010 that not all teachers actually returned after having indicated they would in 2009.



The final question in the teacher’s questionnaire is about engagement in the program preparation. The results are shown in the figure above. The results show that teachers were and still are very hesitant to participate in the preparation. This is the major reason why the Twente team doesn’t organise a teacher preparatory meeting. The results of the teacher survey confirm our good choice in this respect.

### 3.5.3 *Lecturers and volunteers*

Most lecturers and volunteers considered the program content and quality as suitable for the children since they got very positive feedbacks from the children during the workshops and lectures. So overall they enjoyed SAUCE. The University campus is also considered as one of the strengths of the program. However one of the flaws of the SAUCE program is the long distances for some schools.<sup>2</sup> Some participants described that pupils were already tired from the trip. Furthermore some groups arrived too late thus either missing parts of the event or the lecturer needed to cut parts of the event. Therefore, some children had difficulties to follow the event or to understand the content. Furthermore the time schedule was experienced as too inflexible. The time schedule left almost no room to extend event duration.

Another positive aspect was how the children were facilitated by the program. Most participants enjoyed the breaks with free tea, coffee and cake together with the children and the teachers which had a positive effect on the communication.

Some participants regard the limited budget of the SAUCE project as a weakness. The limited budget forces the participant to organize the events as cheaply as possible which sometimes is time consuming. Furthermore the available time of lecturers and volunteers is another flaw of the project. The workshops and lectures must be well organized and be suitable for the pupils which is very time consuming as it needs to be done next to the daily routine which makes it difficult for participants. Furthermore for some events the maximum group size is reached. Some workshops became too noisy because of the bigger group size. So they question the SAUCE target to attract more pupils with every event. A solution could be to have the events more than once but that demands more volunteers and time from the lecturers. Finally the communication is often regarded as too late. This hampers the organisation of some events. Additionally, the participants realized that it is very difficult to attract sponsors. Finally the dissemination of the SAUCE is experienced as too slow-moving.

#### *SAUCE in the local infrastructure of energy education for children*

After two years and two program runs, SAUCE has become more known in the local teaching network as the "University for Children on energy and climate". Right from the start of the project, SAUCE managed to link up with the local environment and nature group of the municipal of Enschede. This organisation supported the local SAUCE team tremendously to find its way in the local community. From there the local network developed stepwise and now covers quite some groups and organisations. SAUCE managed to line up with the University infrastructure and programs for children. The focus of these programs and activities differs from pedagogy for future teachers to stimulating science and technology among young children. SAUCE provides content to these activities on the theme energy and climate. SAUCE also managed to extend the number of locations of the program. Early 2011 SAUCE will offer a two days program

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<sup>2</sup> Please note that this remark should be understood in the context of the Netherlands.



together with SABUKI, a science café for children and the teacher university in Deventer. SAUCE also developed relationships with several schools in the environment interested in special programs for children. With a group of schools in Glanerbrug SAUCE will become part of a university for children with a wider focus than only energy and in Zwolle we will cooperate with a high school offering special science programs for their youngest pupils.

Finally SAUCE also linked up with the museum for technology in Hengelo. Together we developed an energy game children can play in the museum. The museum will also participate in the 2011 program SAUCE program with energy experiments. More groups have shown interest in SAUCE and we discuss continuation of the activities after 2011 when the SAUCE has stopped. One of the options we currently work on the development of a chain of activities for children on the theme of energy offered by a local alliance of different organisations. Within this setting SAUCE could continue to provide energy lectures and workshops for children at the university.

#### *3.5.4 Conclusion*

According to the pupils', teachers' and volunteers' evaluation, the overall impression of the 2010 SAUCE program is positive. The program reached its target to raise interest in environment and energy issues. Pupils learned something new and consider SAUCE as a positive learning tool. Moreover the teachers regard the SAUCE as a good learning tool and enrichment for the school program. Nonetheless in a rural area such as Twente, the University being the hub and the new learning environment hampers the number of participating schools since the distance from the schools to university is experienced as "too long". Also the SAUCE project finances are experienced as a major flaw of the program. The participants and volunteers evaluation of 2010 and 2009 indicates that the communication greatly improved but still needs to improve further. The rigid schedule was experienced as too inflexible in 2010 while in 2009 only the teachers criticized the rigid time schedule.

#### *3.5.5 Lessons of the 2010 program*

The entertainment event added to the program in 2010 was very well received by children and teachers and this activity also will be part of the 2011 program run.

The workshop climate breakfast was also very well received. This workshop was offered at a local farm run by disabled people and this was a very productive collaboration.

In general we found out that the 2010 child audience appreciated the workshops and excursions over the more intellectually demanding lecturers. However, in general the 2010 program developed a nice mixture of lecturers, workshops and excursions. IN the 2010 program we had 2 new excursions, one to a waste incineration and the second to a sewerage site and both were successful. In the 2011 program these excursions will be offered again and we will also offer a new one to a company recycling clothing.

The 2010 audience of children in general was less concentrated during the program than the 2009 audience. For the program it is important to account for more diversity in the audience and to a bit flexible to adapt to the capacities of the audience.

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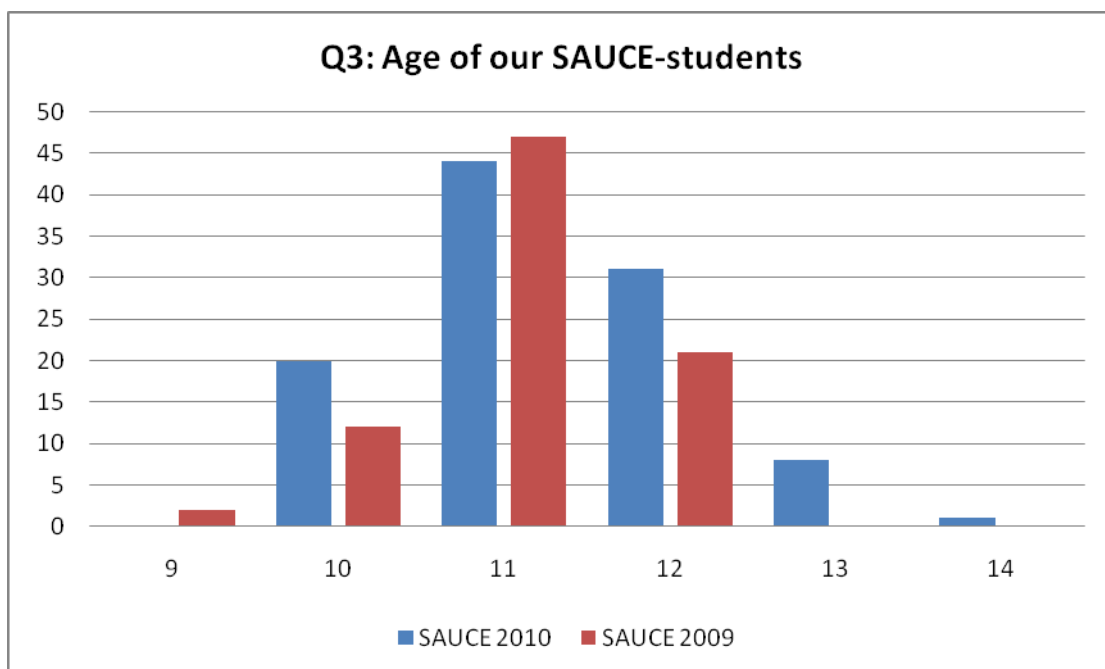
The 2010 program learned that the times of starting and ending the program events should have a good match. It is important to know that groups of children don't move that fast from one classroom to another. The timeframe of the 2010 program was sometimes too tight

The 2010 program learned that the staffing of the program week needs to be increased. We need more hands to handle the increasing number of children and teachers attending the program. Since it is very difficult to get students in the examination period we will develop collaboration with the municipal organisation of volunteers.

### 3.6 Vienna

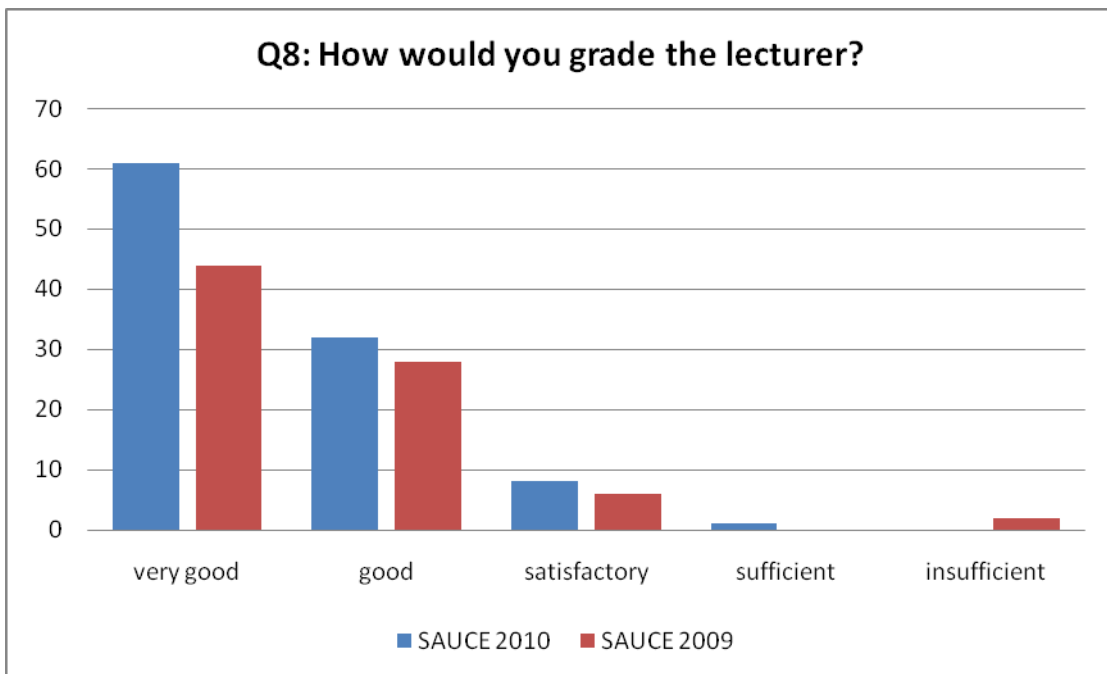
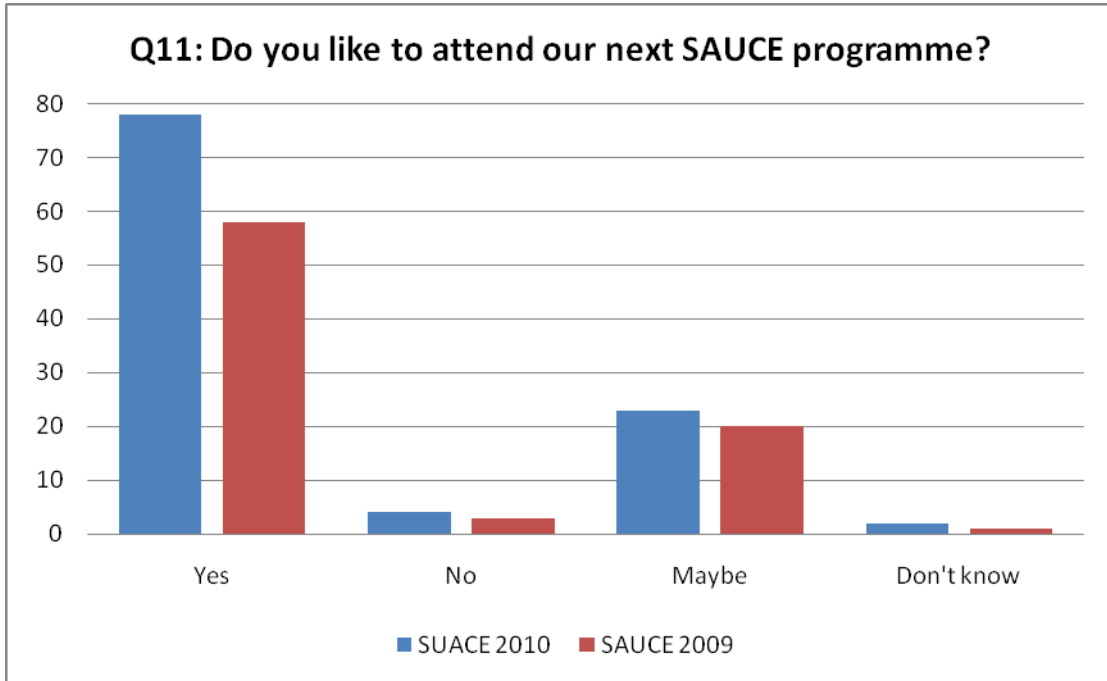
#### 3.6.1 Children

Our student assistants got questionnaire-like interview guidelines for assessing the pupils' perception of the SAUCE program in detail. 2-3 kids per class were chosen for those interviews, covering 10.6% of all pupils attending our SAUCE 2010 program (1005 pupils in total). 50 female and 57 male pupils were interviewed by an average age of 11.3 years (see graph below). In order not to overstrain the kids and not to take their attention off the lecture the interview consists of eleven questions only. Following the findings of children's perception are described in more detail.



By their experience of the SAUCE 2010 program the absolute majority of children also wanted to attend the next SAUCE event, while several kids were not sure by various reasons, e.g. the teacher will apply again. Only four kids (3.7% of the sample) didn't want to attend again because they didn't like the topic or found the event too childish. This also accords with the marks the lecturers received by the children; the vast

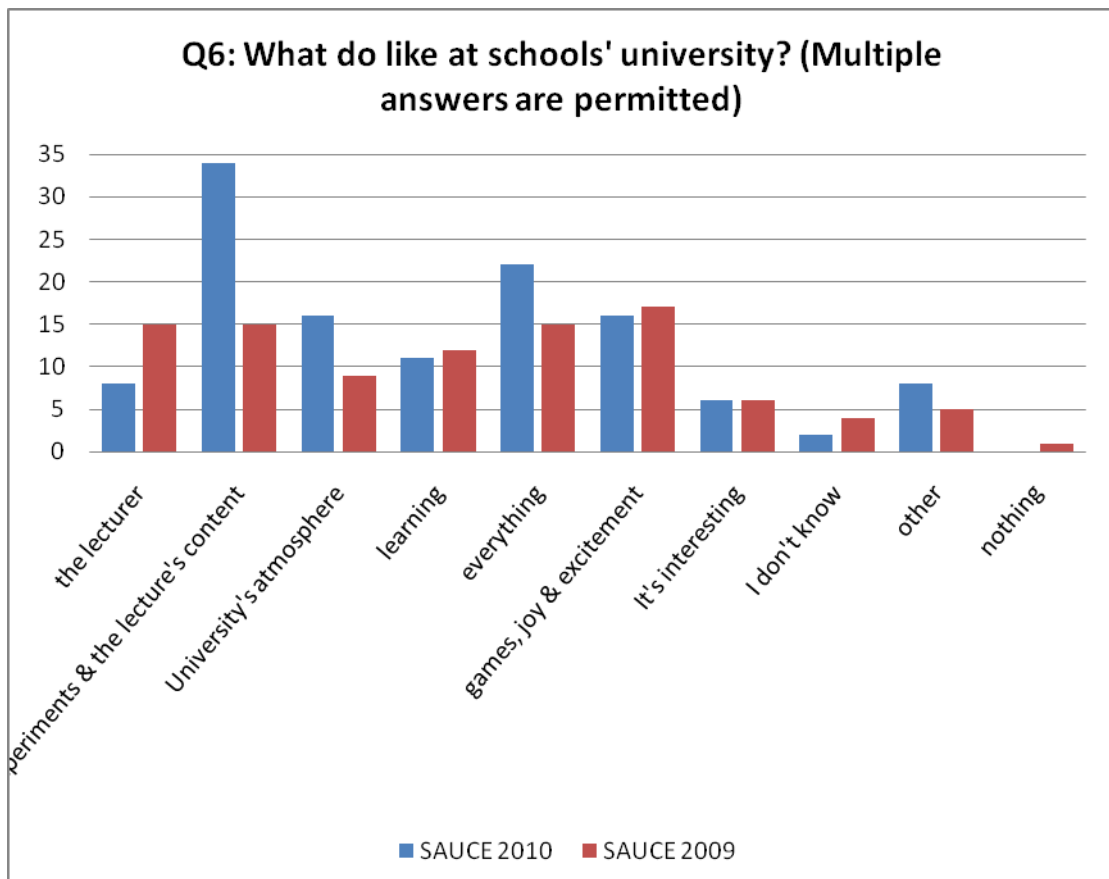
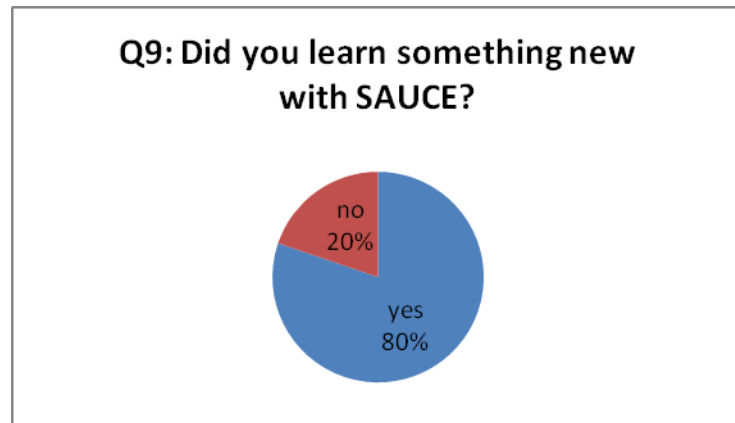
majority - almost 87% of the sample - stated “good<sup>3</sup>” or “very good” as preferred grade for the lecturer. 50% of the children graded the lecturers “satisfactory” also answered question 11 (see graph below) with “maybe”.



The program had a huge impact on the children’s perception of energy and climate like shown in the graph below (Q6 and Q9). 80% of interviewed children stated a gain of

<sup>3</sup> According to Austrian school grades: very good (1) – good (2) – satisfactory (3) – sufficient (4) – insufficient (5)

knowledge while the answers to this open question were too various to build meaningful categories out of them. The answers mostly depended on the attended workshop. A similar question (Q10) “Do you have any ideas about renewable energy and climate mitigation?” has shown many various ideas but especially the following answers very often (similar to the 2009 event): “Reduce water and energy consumption”, “use public transportation instead of private cars”, “recycling”, “environmental protection” and “electro mobility”. These answers can be seen as the “real” impact of the SAUCE program among the target group – the kids.



The findings of question 6 “What do like at schools' university?” are also in line with the results shown above. Beside the fun-factor (e. g. “It’s something brand new”) pupils liked the lecturer and experiments most in 2009 while experiments and the lecture’s content was mentioned mostly in 2010. The organising committee is very proud that some kids stated to like everything about the SAUCE program but keeps some criticism in mind, that some parts of the program have been assessed as too childish. Experience of SAUCE 2009 and 2010 showed that workshops which are liked by the 5<sup>th</sup> grade are seen as too childish by the 6<sup>th</sup> one sometimes. Therefore, the organisation team will give age recommendations to teachers before 2011 registration. Again, very interesting is that some children stated exciting learning approaches or learning in general as their most preferable outcome of the event and additionally some children said that they appreciate the university’s atmosphere (e. g. the large lecture halls, university is an exciting place to be). Q8, Q9 and Q11 presented above in 2009 and 2010 have almost identical results although different kids were interviewed and the interviews were carried out by different students, which is very astonishing. There’s no sound explanation for this phenomenon.

Concluding the children’s evaluation most of the pupils received a gain of knowledge by attending the program. They enjoyed the pedagogical concept including many experiments and lot of funny games as well as the location; “Now I know how a university looks like” was therefore a representative answer. Negative assessments only appeared if the workshops were seen as too childish or to less playful or the pupils felt too less interaction. That also shows that it is very hard to reach this age group appropriate; while ones want less childish elements, the others prefer more games. Very interesting was as before in 2009 the fact that some lectures that our assisting students and the teachers stated to be overstraining the pupils the kids themselves enjoyed and graded the lecturer “good” or even “very good” which points to a smaller confidence of grown-ups in pupils’ skills than they have in their own perception. Overall the children’s evaluation shows a very much appreciated and suitable SAUCE program that only has to be improved in some minor parts.

### 3.6.2 Teachers

The questionnaires were handed out to the teachers at the registration desk. The student assistants supported the teachers in case of questions and collected the completed questionnaires. Due to this procedure a 70% response (56 questionnaires) was achieved. For the teachers questionnaire see Annex 2. Some questions of the 2009 questionnaire were replaced by new ones or skipped completely in the 2010 version, which made the questionnaire by five questions shorter.

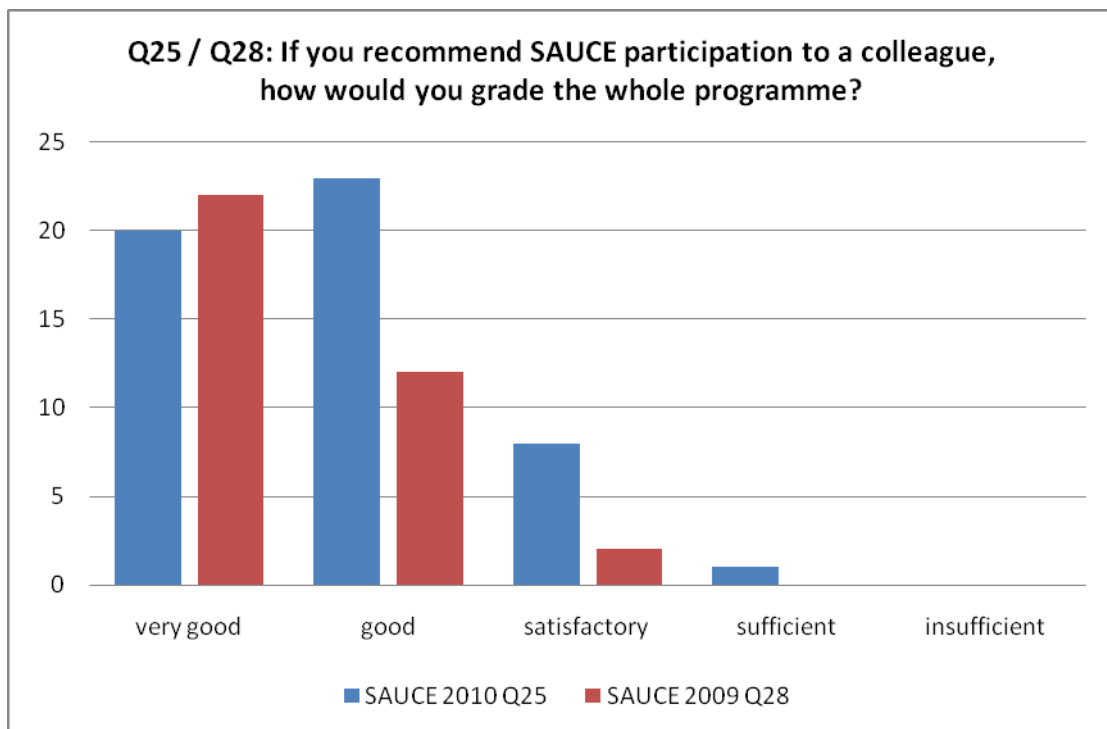
The following graph shows the overall assessment of the program by the teachers. Approximately 83% of the teachers assessed the second SAUCE program as “good” or “very good” (according to the Austrian school grades), which is a bit less than 90% “good” or “very good” at the first event. Teachers were a bit more censorious at the second event, shown by a lower average mark of the SAUCE program (1.8 instead of 1.4 at the first event).

	Mean 	Standard	Sample
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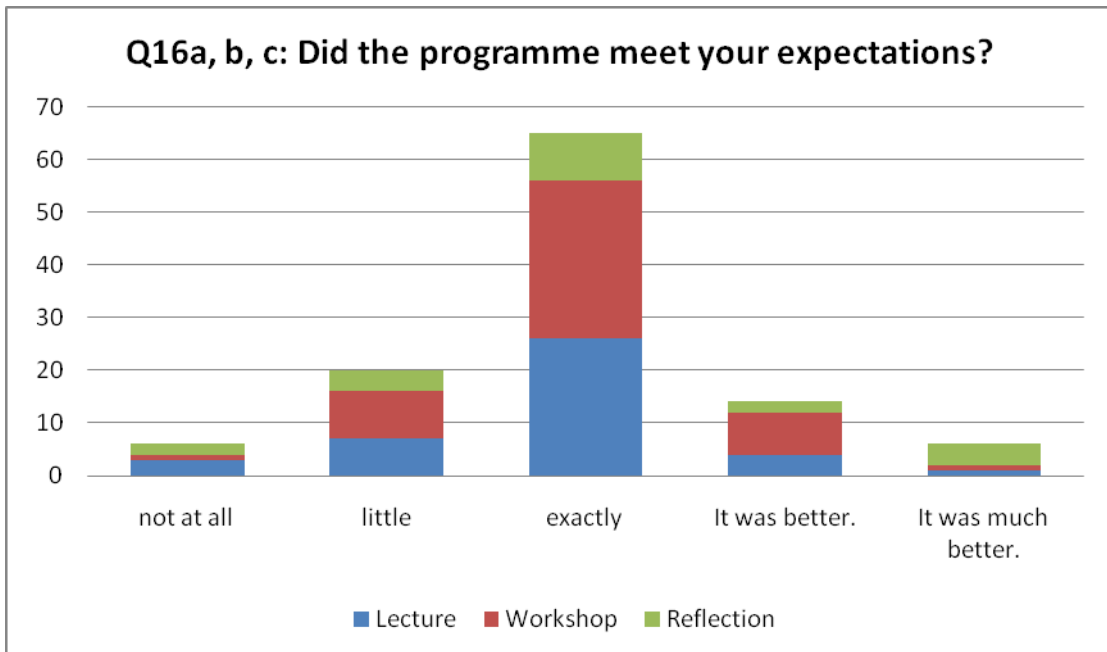
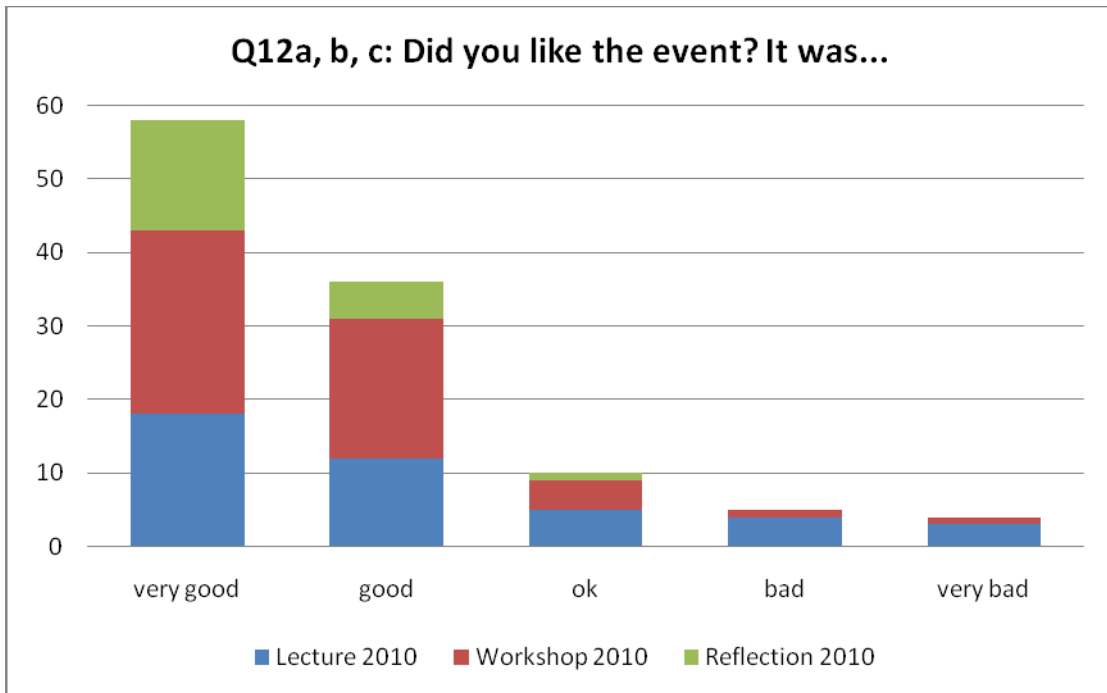
		deviation $\sigma$	size n
SAUCE 2010	1.81	0.7538	53
SAUCE 2009	1.43	0.5911	36
$\sigma_d$		0.1429	

$$u_{prof} = \frac{\bar{X}_1 - \bar{X}_2}{\sigma_d} \leq u_{1-\frac{\alpha}{2}}$$

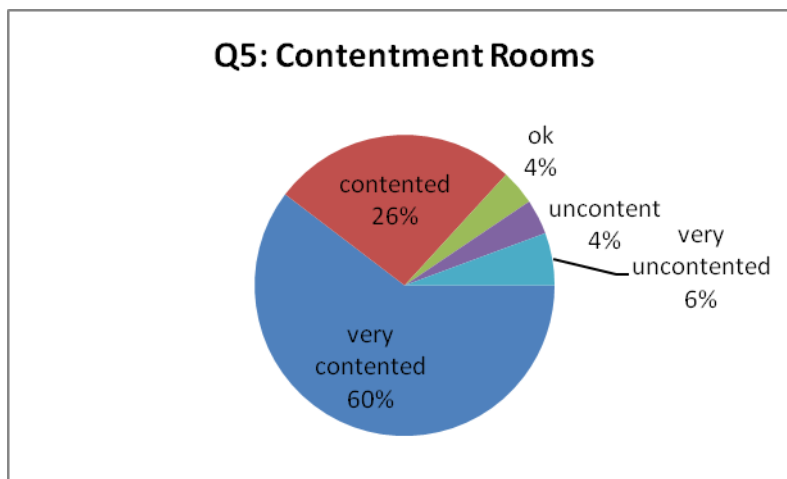
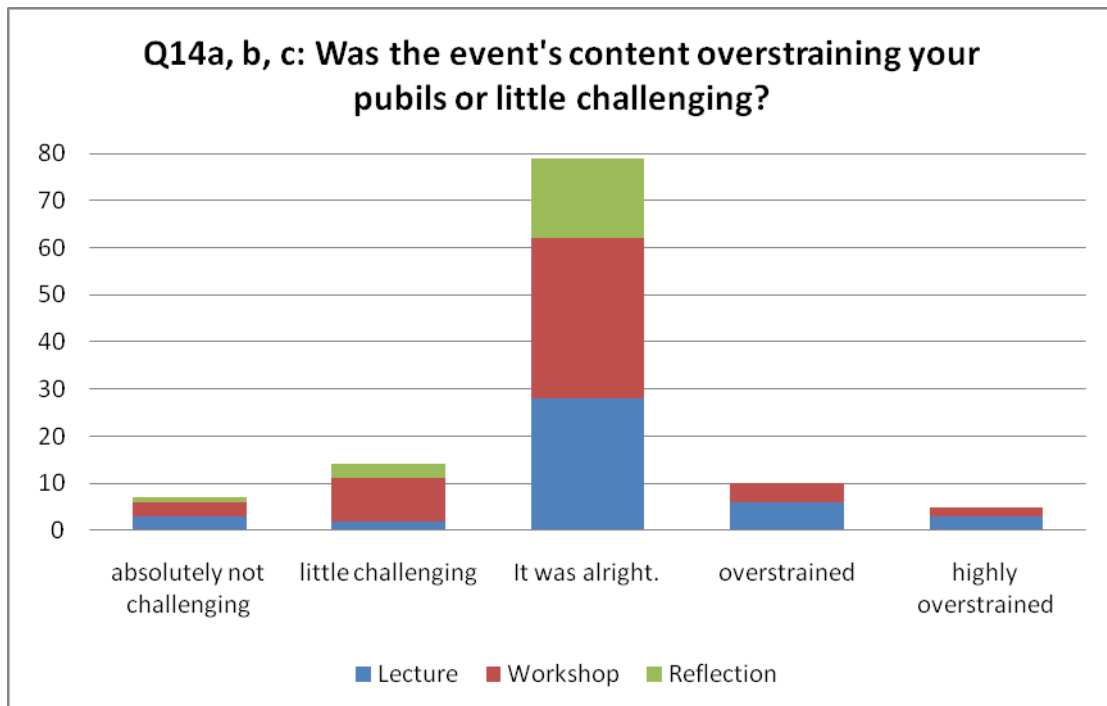
By a confidence level  $1-\alpha = 95\%$  there is a significant difference between the 2009 and 2010 mean of the marks for SAUCE given by the teachers. No specific reason for this significant result was observed and so the organisation team will listen closely to teachers' opinion while preparing the 2011 SAUCE program.



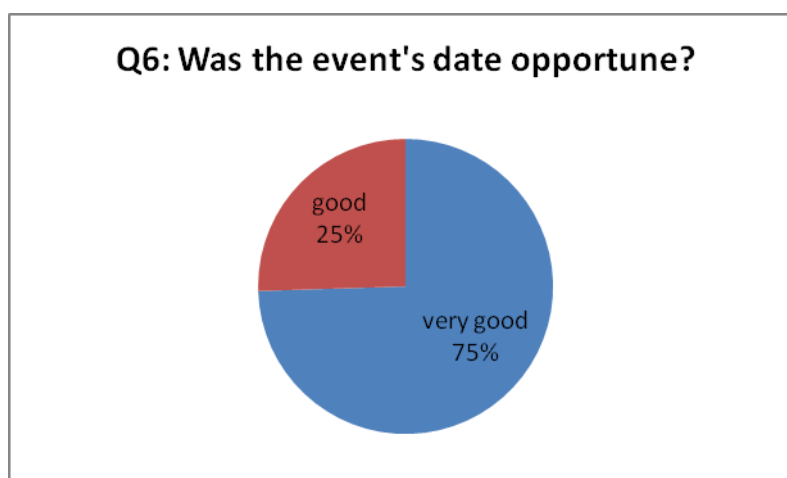
Most of the classes attended the starting lecture, a workshop and the reflection. The following graph shows the assessment of the teachers for these single parts. Since the workshop was the longest and probably most dominant part of the each day's program, the interpretation of this graph is not straightforward. On the one hand, of course it shows a high degree of satisfaction with the overall event. On the other hand it shows that the starting lecture was assessed less positively than the workshops. (This finding is in line with the feedback from team members and student assistants; see below). However, special attention should be given to those responses with low overall assessment grade. We will come back to that below when we are dealing with qualitative aspects and personal comments of the respondents.



In general, most teachers thought that the content of the event was in line with the skills of the pupils. Some teachers thought it was too complicated and a few thought it was too easy.



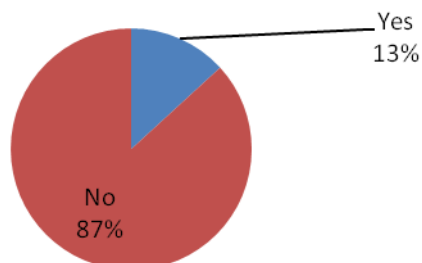
The following graphs show to which extent the teachers were satisfied with the rooms and the date of the second SAUCE program in Vienna (Mid of February 2010). While there are always some complaints about the rooms in the historic main building of Vienna University of Technology, e. g. to small lecture rooms, toilets are too far away, which cannot be solved by the local organisation, all teachers appreciated the date of the second program. Teachers are known to be censorious – at least in Austria – but all of them assessed the date



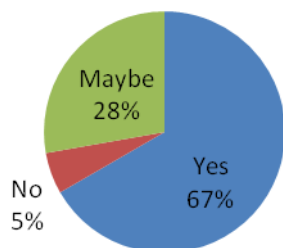
“good” or even “very good”, which is very astonishing. 13% of the teachers participated twice in 2009 and 2010 as Q7 shows. Taking into consideration that the first and the



**Q7: Did you participate at the last SAUCE event 2009, too?**



**Q8: Are you interested in participating again?**

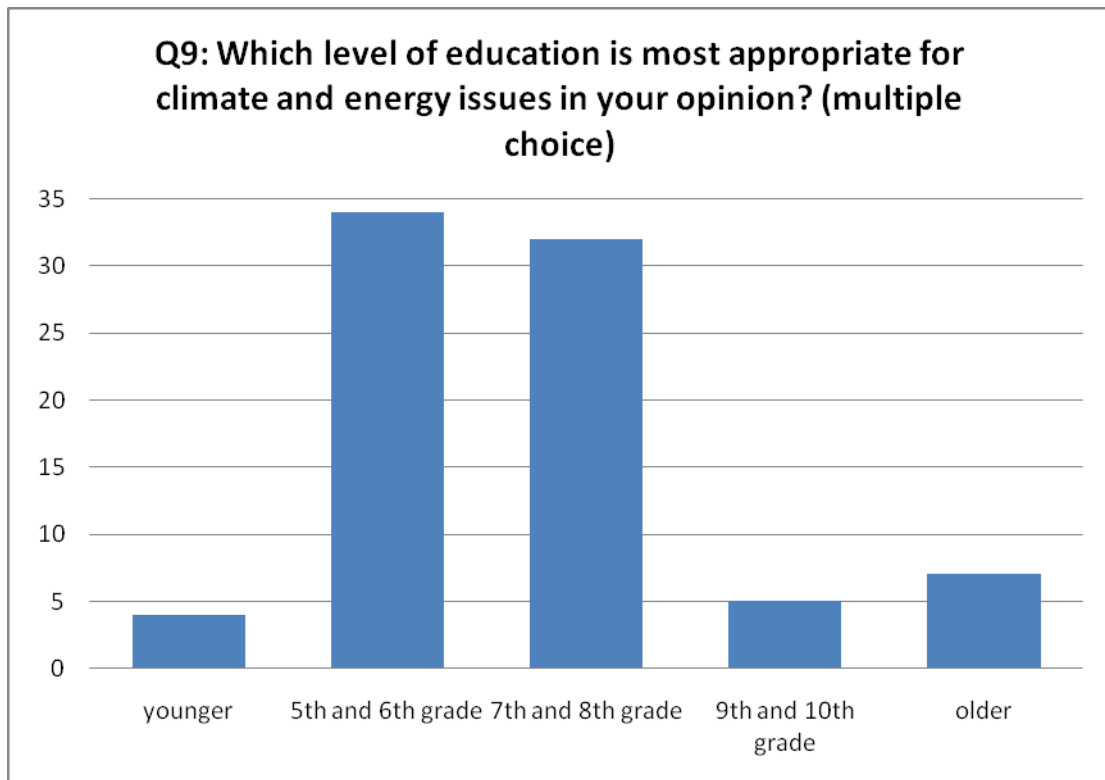


second Austrian SAUCE program took place in the same school year with only five months between this can be seen as a manifold success: First, some teachers came twice, sometimes even with the same class while many teachers of the first event motivated some colleagues to participate with their classes as the registration has shown. Schools came with several classes to the second program if the participated at the first SAUCE program. Second, the vast majority of teachers at the first and the second SAUCE program have shown their interest to come again. This means that the workshops for

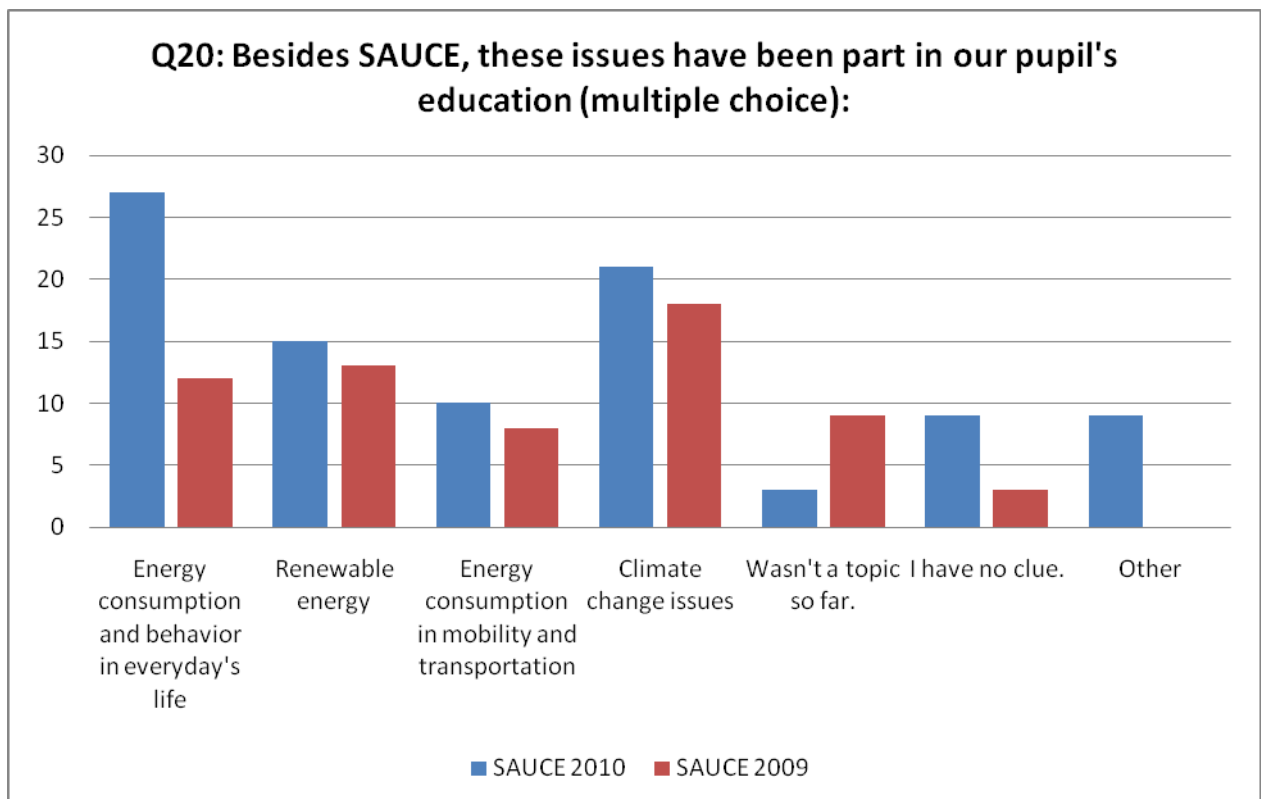
SAUCE 2011 are almost booked. This shows that the Austrian SAUCE program is well received as supplement to the regular curricula by the pupils and their teachers as well.

Most of the pupil's regular curricula include some of the issues addressed in the SAUCE program according to the teachers' estimation (see Q20). In particular, energy consumption and behaviour as well as climate change issues are the most important topics. However, it is not clear to which extent this is true in an average Austrian school class because the sample represents motivated teachers participating in the SAUCE program only. Regarding the level of education the 5<sup>th</sup> and 6<sup>th</sup> grade<sup>4</sup> as it is SAUCE's focus and the 7<sup>th</sup> and 8<sup>th</sup> grade are seen as the most appropriate classes for educating climate and energy issues. That means SAUCE in Austria covers only half of the adequate age from the teachers perspective actually. That is also in line with the experience of the organisation team. Many teachers asked to participate with 7<sup>th</sup> and 8<sup>th</sup> grade classes so far.

<sup>4</sup> In Austria 5<sup>th</sup> and 6<sup>th</sup> grade usually means 10 to 12 year old children, 7<sup>th</sup> and 8<sup>th</sup> grade are 12 to 14 years. Some deviations of the pupils' age occur due to the Austrian educational system.



Most teachers were satisfied with the program, its content and the organisation. Some



complaints rose among the starting lecture (e.g. too many pupils in the lecture hall, too noisy, overstraining content) which are taken very serious by the organising committee;

for corrective action see section 5 and 7 of this report. Some improvements based on teachers' perception of the first event have already been established for the second SAUCE event, which lead to a better assessment of most offers.

### *3.6.3 Lecturers*

The organising committee had a very intensive and kind contact before, during and after the SAUCE event with the lecturers and educating children was not new for most of them. Therefore qualitative informal personal feedback was chosen as evaluation method for this peer-group.

The lecturers' opinion towards the SAUCE project was a very welcoming one. On the one hand it gave them opportunity to present their organisation to a broader public on the other trying new approaches as it was the case with some scientists participating.

We refrained from giving a more thorough guideline on how to present a subject to young listeners due to the diversity of approaches and experience of most of the lecturers. This will be reconsidered for the SAUCE event in 2011.

Additional information on the age of the and the type of school was given to all lecturers in order to enable less experienced "teachers" to get a crude picture of their target audience. Overall the logistics and organisation was again one of the very much appreciated features. Concluding the lecturers' perception of the program they mostly stated the professional support by the organising team including student assistants and a pleased auditorium as their strongest impressions of the program.

### *3.6.4 Volunteers/organizing committee*

The core group of Viennese organizing committee includes three persons. They've been supported by subcontract partner "IG Windkraft" and student assistants during the event who wrote term papers including their major impressions of the program. These qualitative findings as well as the perception of the core group are summarized in the table below. Thus the evaluation covers 100% of the organizing committee. Besides, the core group and the mentioned subcontractor spent an afternoon on evaluation by using self-reflecting techniques right after the first and also the second SAUCE event.

**Table: Impressions and findings of the organizing committee**

	Positive	Negative
Internal factors	Strengths	Weaknesses
	<ul style="list-style-type: none"> <li>○ Competencies complementing one other</li> <li>○ high commitment</li> <li>○ Excellent communication within the organising team</li> <li>○ SAUCE-course is now part of the official university calendar</li> <li>○ very good contacts to assisting departments/staff of the university</li> <li>○ Very good cooperation with students, also due to the course that has been arranged for them</li> <li>○ Smooth event</li> </ul>	<ul style="list-style-type: none"> <li>○ Additional funding scarce</li> <li>○ Improved publicity in media from 2009 to 2010 but still rare compared to Kids' University Vienna in Summer</li> <li>○ Few students know about the opportunity to take part in a SAUCE program</li> <li>○ Technical support by university</li> <li>○ Lecture halls are highly separated</li> </ul>
External factors	Opportunities	Threats
	<ul style="list-style-type: none"> <li>○ Vienna as an urban centre esp. for surrounding countryside</li> <li>○ Public transport sufficient</li> <li>○ Product is unique in Austria</li> <li>○ Topics highly up to date</li> <li>○ Infrastructure</li> <li>○ Large number of contributing institutions</li> <li>○ Mouth to mouth propaganda established a good awareness amongst teachers</li> <li>○ Various "climate and energy" related sites are close to university</li> <li>○ Large number of potential lecturers</li> <li>○ Many additional pedagogical concepts available</li> </ul>	<ul style="list-style-type: none"> <li>○ No additional funding in the future</li> <li>○ Decreasing number of assisting students while the number of workshops &amp; lectures is increasing</li> <li>○ Preparing a large SAUCE program may take too much effort in working hours</li> </ul>

The student assistants' recommendations on improvement as well as perceptions of the organising team including feedback from teachers, lecturers, supportive staff from university and the pupils of course lead to a vast insight in various aspects of the program and surrounding issues. Due to the first event was appreciated by most participants only small corrective action for preparing the second has been taken (e.g. offering more workshops, revision of starting lecture). Therefore the small number of complaints decreased at the second SAUCE event even to a smaller level. Additionally, by continuous communication within the core group and the stakeholders steadily improvement of the program is guaranteed.

### 3.6.4 Conclusions

The evaluation of the second SAUCE program, as the first one before, served a vast number of various qualitative and quantitative data. Some major highlights representing the whole data set were shown in the sections above. Children and teachers assessed the content and the used pedagogical approach to be adequate to the target group among a large majority. Only a few workshops were outstanding and even fewer inadequate. Although the organising committee is very pleased by this very comfortable feedback a special eye is put on the starting lecture (noise; probably too many kids in the room) and two workshops with bad assessment. Some other complaints were identified as irrelevant as they came from eccentrics (e. g. One complaint was about important information missing, while it was provided on the SAUCE-webpage, including a link in the registration email.)

Organisation and logistics of the event was highly appreciated by our guests (pupils, teachers and many lectures). Significant suggestions on improving the logistics were implemented (eg. concerning registration procedure on site, group size in the reflection part).

The structure used (starting lecture, workshop and finally a reflection) was highly accepted among all groups. Especially the children gave a very positive feedback about the location of the SAUCE event. Some concerns by teachers and the assisting students about too small lecture rooms were noted which was true to some extent because all suitable rooms aren't available any time. The communication with the stakeholders was perceived very positive. For the most important conclusions of the first and the second SAUCE program also see section 8.

### 3.6.5 Local revisions

Some of the local revisions have already been carried out for the second SAUCE program:

- ✓ Less lectures, more workshops
- ✓ Revision of the starting lecture (one single lecture to be held each day in the same form)
- ✓ Small improvements in registration procedure and webpage (e.g. better wording)
- ✓ Small improvements of teachers and pupils questionnaires (removal/adding of some questions)
- ✓ Revision of some organizational aspects of the reflection
- ✓ Providing a master table (excel file) for students evaluation
- ✓ Gaining new media contacts for better press coverage
- ✓ Briefing of lecturers regarding age of the pupils and type of school

New revisions for the third program:

- ✓ Briefing for the lecturers of the starting lecture
- ✓ In deep briefing of two workshop lecturers or removal of the workshop

### 3.6.6 Lessons learned for the SAUCE format

- Workshops are preferred rather than lectures. That means less pupils in total reached per event but assuming equal duration of workshop and lecture it leads to a higher interaction rate (measured e.g. by lecture time per pupil).
- Continuous communication - which is indeed a kind of informal feedback loop - with teachers, lecturers, supportive staff, assisting students (if applicable) and within the organizing committee is the most important factor for continuous improving of the program's quality.
- Beside fun, action and experiments pupils appreciate the exciting learning environment and university's atmosphere very much.
- Pupils assess challenging workshops better than adults do, which means that the pupils want to be claimed by the lecturer and the topic as long as the lecturer responds to the pupils' skills and capability.

### 3.7 Latvia

So far we have had one SAUCE programme run and are under the preparation for the second one. In addition to the evaluation procedure we used at the first run, short express interviews with participating pupils will be done during the programme run.

## 4 Conclusion and recommendations

The final chapter summarises the common major conclusions of the country evaluations and the lessons learned.

### 4.1 Conclusion on evaluation approach and method

- The evaluation had a two dimensional focus: the program, content, quality and organisation and the impact of the program on pupils, teachers and schools. The first evaluation concentrated on the program dimension and could only preliminarily address the impact dimension.
- In 2010 six of the seven SAUCE programs could organise a program evaluation. However, two evaluations are not part of this report due to delay in processing results. One program had one program run which was already reported in the previous report.
- In 2010, the SAUCE program managed to attract substantive numbers of pupils and schools to the university on the theme of energy and climate.
- The evaluations used similar approaches and methods, but dressed in local flavours. All locations worked with questionnaires for children and teachers and interviews with lecturers, local organisers and voluntaries. Some partners interviewed children directly or some time after the program, individually or as a group. Others asked children to fill in a questionnaire.
- The methods applied in the 2010 evaluation all proved to be productive in providing for required information on program content and quality and to a certain extent on program impact.
- The similarity of evaluation methods applied allows for comparison of the evaluation results between the years. The Vienna and Twente evaluations include quantitative comparison of evaluation results.
- There is a learning effect on evaluation due to the repetition of evaluation. This helps to evaluate the local programs in an efficient and effective way.

### 4.2 Conclusion on program content and quality

- In 2009 all programs were very well received, but all got comments and suggestions for improvement from the evaluation. On program content, it was suggested that the balance between “head”, “heart” and “hands” could be improved. The university tends to address the cognitive skills of pupils in particular, which is a good thing as such. But the suggestions all articulated were to be aware of the intellectual level of children and not to forget the experience and doing component in the content of the program. The 2010 programs all reflected this 2009 suggestion and did improve the balance between the three learning foci in the SAUCE program. Some partners added more workshops and others added entertainment. The changes all improved the local program, which is also reflected by the evaluation results. The opinions of children and teachers are however, more modest in 2010 compared to 2009. But the general picture manifests enthusiasm for the program.
- Like 2009, in 2010 all programs ran at the university and again it showed that the university environment clearly adds value as learning environment for children aged 10-13 years. Children, but also teachers, all were excited about the university

environment. The evaluation showed that the university environment made the children more open for the content of the program. The organising teams all learned from the 2009 event by improving the locations and logistics of the 2010 programs.

- In 2010 all programs have been designed by university staff members who are experts on content and substance of climate and energy. The overall high quality content of the lectures was clearly noticed by the teachers and very well received by both children and teachers at all locations. Only incidentally the intellectual level of the event was perceived as too demanding for the children. In general the two years of SAUCE also show that the reception of a program event also depends on the shape the children are in on the day of the event.
- The University lecturers all improved their skills to address the children in the right way. Almost all programs spent time in instruction of the lecturers, the timing and the duration of the events.
- Like in 2009 in 2010, too, the structure and organisation of the SAUCE programs were well received. The organising teams all have learned from the first program runs. The communication and organisation was largely through the internet and this worked well at all locations. There were minor problems with respect to routing and timing of events, but no significant failures as such in the local organisation of the event week.
- In 2010 it showed again that local circumstances to a large extent determine way and intensity of teacher and school involvement in the preparation of the program. It showed that there is not one overall model applicable to involve teachers and schools. The consortium members all engaged schools and teachers according to local conditions.

#### *4.3 Conclusion on program impact*

- In general pupils on all locations received the program very well. Their reactions have been very positive and all program parts were well received. The pupils showed huge absorptive capacity which showed in the evaluation directly after the classes and in group talks some time after the event. Most pupils indicated to have clearly benefited from the program. A sign that the theme energy and climate found fertile soil in the children's mind.
- Teachers and schools indicated that the program had influenced their thinking on the theme of energy and climate. Moreover, teachers found the program very inspiring and several teachers indicated to continue working on the themes in the regular classes.
- All consortium members managed to develop the local and national network and connected to national and international networks on energy and climate teaching for children. The Austrian and German teams managed to get recognition of the UNESCO Decade of Education for Sustainable Development.
- After two years of SAUCE it clearly shows that the programs all have linked up with local energy and climate initiatives and activities for children. At some places the teams are actively working on the continuation of the SAUCE activities after 2011.



#### *4.4 Lessons learned from the 2010 program run*

- All programs clearly indicated that the university is a productive learning environment providing added value to teaching young children on the theme of climate and energy.
- Academically trained university energy specialists turn out to be effective teachers of children aged 10-13 years. The effectiveness of their teaching can further increase by specialised pedagogical support.
- The “head”, “heart” and “hands” program components need a certain balance depending on the cognitive skills and levels of the children.
- A teacher’s preparatory meeting is not absolutely necessary to engage teachers and schools in the program. But the meetings clearly have a positive and supporting effect on networking among teachers, energy education experts and the respective universities. Furthermore, their success is evidence of the engaged teachers’ demand for and, at the same time, a general lack of coherent curricula and teaching materials on energy (efficiency) for successive school levels (for further details cf WP4 report).
- The 2011 program organisation will benefit from lessons learned during the 2010 organisation of the program.

## **Annex SAUCE strategic and specific objectives**

The evaluation focus can be derived from the strategic and specific SAUCE project goals. We made an inventory of all the specific and strategic goals formulated in the project proposal and tried to systematise them. We think SAUCE goals can be classified along two dimensions:

- A. Deliverance, content and quality of the program
- B. Impact of the program at the individual, the network and the institutional level.

In the following overview we have classified all mentioned SAUCE goals along both dimensions.

### **Program deliverance, content and quality**

- Develop an interdisciplinary educational tool for pupils that raise their awareness of the core topics of climate change and sustainable energy use.
- Establish, support and acquire didactical qualities of the Universities as a special location for pupils' education.
- Develop a replicable SAUCE program

### **Program impact**

Individual:

- Show pupils ways in which they as individuals can contribute to climate protection.
- Raise pupils' awareness of intelligent energy and mobility behaviours.
- Strengthen pupils' problem-solving competences with regard to climate change and energy issues.
- Boost pupils' ability to learn effectively.
- Broaden pupils' horizons regarding the international dimension of climate protection and intelligent energy use.
- Raise pupils interest in 'green' sciences (e.g. green chemistry) and in developing green technologies.
- Support teachers to teach intelligent energy behaviour (20% teacher participation preparatory meetings)
- Raise pupils' interest in green sciences and technologies

Network

- Support the development of networks between different educational actors at the regional, national and EU level.
- Promote cooperation and exchange between European educators and non-formal educational actors.
- Disseminate the SAUCE tool through networks.
- Energy education networking

**Institutional:**

- Disseminate energy education tools to schools.
- Encourage and support schools and teachers in taking up energy and climate change issues at school.
- Disseminate and consolidate the SAUCE concept in European universities.
- Establish and consolidate SAUCE as an educational tool.
- Making universities more familiar and attractive to non-traditional groups of potential students.
- Support the integration of intelligent energy use and climate change into the regular curriculum.
- Disseminate the model to other European universities
- Disseminate educational tools on energy and climate throughout member states
- Raise pupils awareness of energy and climate change issues
- Establish SAUCE programs at further European universities
- Make universities familiar to large no. of European pupils

With respect to program content and quality, the evaluation basically should address pupils, teacher and lecturers. Pupils and teachers should also be addressed to evaluate the program's impact at the individual level. The evaluation should monitor and evaluate for example to what extent the actors learn from participation in the project, if they enjoyed participation, if they use SAUCE as education tool and if they would further use and recommend SAUCE. The evaluation should also provide information about the usefulness of the teaching environment, the course contents and design as well as the circumstances of the event. With respect to impact it is for instance relevant to know to what extent the course material is consistent with the school material, if the course content is application oriented, if the duration of the course is sufficient.

**The survey design for pupils**

Due to the fact that SAUCE is an innovative education and networking tool the survey design must be able to show the causality of the SAUCE project, learning and networking effects. Furthermore it is intended as a monitoring and evaluation tool so the survey will be able to show strengths and weaknesses of the project. Therefore the survey includes a pre- and post-survey phase.

The pre-survey phase mainly shows the status quo of the participants before actively participating in the SAUCE project. It sheds light on the personal expectations, motivations, goals, knowledge and interests. The pre-survey phase is also necessary to evaluate the learning effects of the SAUCE project. Subsequently the post-survey phase evaluates the lectures, the university as learning environment, the organization of the SAUCE program, information material and the network of the SAUCE project. The participants will evaluate the project after following the lectures or actively participating.