Marine Geosciences from a Different Perspective: "Edutainment" Video Clips by Pupils and Scientists

J. Dengg, S. Soria-Dengg, and S. Tiemann

Abbreviations

DFG	"Deutsche Forschungsgemeinschaft" (German Research Foundation)
NaT	"Naturwissenschaften und Technik" (Natural sciences and technology)
SFB	"Sonderforschungsbereich" (Collaborative research centre)

1 Introduction

At a first glance, geosciences seem to be a prime example for a field of modern science with a largely positive image in public: They combine high-tech applications with the image of "good old Earth explorers" like Darwin and Wegener, they provide breathtaking pictures from various corners of the planet, they are inherently interdisciplinary using a wide range of methods from physics to biology, and they are directly relevant to many people because geosciences study phenomena like earthquakes or climate change. Consequently, we frequently see documentations on television about the work of geoscientists, where they are portrayed as climbing volcanoes, simulating tsunamis in computer models, diving into the ocean in submersibles or riding into the eye of a hurricane in an airplane.

And yet, when faced with making a decision on a future career, pupils in many countries are not really aware of geosciences as an option. Often, they enrol for a "real" science subject instead (like physics, chemistry or biology). In part, this is

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due to the school curriculum, where geosciences usually do not appear at all or only as a brief period in geography class (Brooks 2010). Many pupils shy away from sciences altogether because they are considered "difficult" or "irrelevant" (European Commission 2004). This is not surprising, because school science is often presented in such a way that the excitement of actual research and its relevance for our lives fail to come across.

Thus, in many places, geoscientists have started initiatives to communicate their work and their topics directly to the public and in particular to schools. However, they are quickly faced with a dilemma: To go beyond the image of geosciences as merely a "soft" science and a great adventure, they need to emphasise state-of-the-art research, but they have to assume that their audience is not familiar with many of the concepts behind it. Or, even worse, they may be confronted with an audience of which a significant part is not really interested in sciences at all. Thus, a big challenge is to break the scientific message down into suitable portions and to present those in an attractive way.

In this article, a project is presented where researchers work jointly with schools in exploring new ways of communicating the concepts and the excitement of biogeochemical and geophysical research and the relevance of this work.

2 Motivation and Rationale

At GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany, a programme for a close collaboration with partner schools has been in place since 2004: In "NaT-Working Marine Research" (NaT standing for natural sciences and technology), projects are defined and carried out jointly by ocean scientists, teachers and pupils from secondary schools. Project periods range from days to a whole school year, and individual pupils, groups or complete courses can participate (cf. NaT-Working Meeresforschung 2013). Disciplines cover all aspects of marine research including ocean physics, marine biology and chemistry, meteorology, geology and geophysics. The emphasis is on active work by the pupils on up-to-date science topics, usually involving experiments, sampling, literature research and discussion with the scientists. These activities are tied into the institute's outreach concept, and their results are shown to the public at Open Days or other special occasions (Fig. 1).

Building on this background, and supported by the scientists of two major research consortia in Kiel (Collaborative Research Centres 574 and 754, both funded by DFG, the German Research Foundation), in 2008 GEOMAR's school programme decided to initiate a project that adds a new and unique component. "Traditional" outreach work (press releases, web pages, etc.) was supplemented by the production of video clips to carry the science of the two research programmes into schools and to communicate its relevance to the public. To achieve this, a critical part of the target audience (i.e. the pupils themselves) was involved and contributes directly to the project.

However, communicating the background of the research topics of the two SFBs (short for "Sonderforschungsbereiche", i.e. collaborative research centres)

Fig. 1 Pupils demonstrating their earthquake simulator to visitors during Open Day at GEOMAR

proves a formidable challenge: SFB 574, after 12 years now in its final phase of funding, deals with “Volatiles and Fluids in Subduction Zones” (cf. SFB 574 2013) and is mostly focused on geological and chemical aspects of plate tectonics. SFB 754 (presently starting its second 4-year phase) concentrates on “Climate-Biogeochemistry Interactions in the Tropical Ocean” (cf. SFB 754 2013) and investigates the physical, chemical and biological processes at work in oxygen minimum zones in the Pacific and Atlantic. Clearly, both science projects work on highly specialised questions at the cutting edge of research. The knowledge required for an appreciation of their new results often greatly surpasses high-school level and is completely beyond the horizon of the “average man on the street”. The challenge thus is to concentrate on the background of this research and explain its relevance based on fundamental concepts that are easy to comprehend. Furthermore, ideally this has to be transported in a way that is also attractive to the young generation.

Thus, a new concept was introduced in the project “SFB Outreach”: Mentored by the researchers and special staff, pupils from partner schools produce “YouTube-style” online video clips (Fig. 2) on particular aspects of the research topics. As contributions gradually accumulate, they add up to a video-mosaic that begins to portray the concepts behind the science. To be effective, the resulting video clips must be:

- Short (i.e. web-consumer-friendly with a length of about 5 min and focusing on only one particular scientific concept, such as oxygen isotope ratios in seawater under different climatic conditions)
- Original (these productions cannot hope to compete in quality with professional TV documentaries, and so they have to compensate by being funny, exciting or “cool” and, if possible, “addictive”)
- Freely available (for download as teaching material in class or to be shown to friends)


Fig. 2 Video shooting during summer school programme

The primary target audience are the "producers" themselves: By forming small teams with a distribution of tasks (from scriptwriter to film editor), even pupils who would usually turn their back on sciences are personally brought into contact with research, technology and real scientists. Ideally, during this process, some of them will discover that science can be fascinating after all. Once the video clip is completed, it will carry this message also to their friends and other pupils.

However, as in most projects that try to attract pupils to sciences, it will be virtually impossible to quantify if this approach really manages to attract any new students to study geosciences at university. There are too many other factors that influence such a decision, and it is very hard to keep track of test persons over several years. For this among other reasons, a secondary effect is targeted at teachers. During the video production or by the video clips themselves, they are introduced to new research and new ways of presentation, and they may find that some of the ideas and materials can be used to enrich their science teaching.

Thirdly, the broader public can be reached through the products of these courses. To support this, the video clips and materials for school are made available online on a dedicated website (SFB Outreach 2013).

3 Implementation and Timeline

The key elements of SFB Outreach's concept are (1) the active participation of the pupils who are confronted with the challenge of understanding a particular science topic and who contribute their own style and language in communicating it to other pupils; (2) the involvement of ocean scientists who make sure that in an effort to create "cool" videos, scientific content is not sacrificed; and (3) the support by teachers, which is only readily given once they are convinced that this approach contributes to their teaching in a positive way.

Although positive signals from all these groups had been received when writing the proposal, when SFB Outreach was approved and funded by DFG in 2009, the potential contributors needed to be activated. To achieve this, a coordinator with a background in public outreach of science was recruited to act as a liaison between the research institute and the schools and to administrate the day-to-day affairs of the project. In consultation with professional video producers, five sets of video equipment were initially acquired, containing HD video cameras, microphones, media for data transfer and storage and computers for editing video footage. These materials are available for loan to schools and have been in almost continuous use since the start of the project. In several workshops, video professionals provided initial training on video production to the project's staff.

In parallel, the first meetings with teachers were organised to introduce them to the idea of the project and to discuss the feasibility of conducting video projects on the topics of SFB research in their schools. Although several teachers had been quite open to this during the proposal stage, the concrete suggestion of starting a video project in their own class now encountered considerable reservations. Usually, these were related to the time frame of the project and/or the particular topics that could be accommodated in the curriculum. Some teachers also questioned whether "producing just another video clip" really has sufficient educational value. To bypass this, contacts were made to teachers who offer video activities as after-school projects. This, however, soon turned out to be a dead end because most of the pupils participating in video groups do so for artistic reasons and not for science.

On the other hand, some of the scientists doubted that pupils are capable of communicating their complex scientific topics. In particular, they questioned the pupils' ability to narrow down individual aspects of their research to the required few minutes of online video while conserving the core message and embedding it into an appealing story line or design.

To overcome these difficulties, a small 2-day workshop for teachers and pupils was held together with scientists in January 2010. The first practical exercises quickly convinced all participants that the task at hand was manageable and indeed suitable for secondary schools. In the next months, the first experimental productions were carried out with small groups of pupils who happened to be participating in an internship programme at the research institute and volunteered for the video project. As a result of the first feedback by these pupils, modifications to the programme were made. Video-editing software for beginners was adopted instead of semi-professional products that proved to be too complex and resource demanding.

Eventually a routine developed in which the pupils (typically of age 15–19) first receive instructions on the handling of the video equipment, an introduction to the tools and methods of video editing and to the concept of a storyboard. Then, researchers introduce them to their science topics in one or several oral presentations, sometimes in combination with a visit to the laboratory and a look at their

Fig. 3 Pupils learn to take samples from a sediment core in the laboratory

instruments or samples. (In most video projects so far, these first steps take up about 2 days of the project). If more time is available, pupils are involved in practical work, e.g. by taking samples from a sediment core in the laboratory (Fig. 3), by setting up Winogradsky columns to study microbial ecology or by growing phytoplankton cultures in bottles on the windowsill.

If working with a complete class, the group is split up into production teams of 4–6 pupils. Each team has the task of creating its own story plot that places the science topic into a new context to approach it from an unexpected angle for better effect. Styles of presentation can be commercials, children's programmes, documentaries, music videos, short dramas, etc. To minimise the temptation for the scientists to impose their own preferences on the presentation, the storyboard is usually created independently by the pupils. However, at some point during this process, feedback from the researcher is important to discuss if an intended interpretation does justice to the science topic and to clarify emerging questions on the science. Typically, this stage of the production may take several hours or up to 1 day.

In the next step, the actual camera shooting takes place, involving the pupils as directors, sound and light technicians, prop designers, special effects supervisors or actors. (Note that – particularly for work with a complete class – these technical or artistic tasks are often ideal for pupils who are less inclined towards sciences). Once all scenes are done, the pupils concentrate on post-production (Fig. 4), i.e. the editing of the material, additional sound work, creation of titles and credits and selection of music. This aspect of the production takes up at least 2–3 days but should be allocated more time if possible.

The entire process described so far typically requires a minimum of 5–6 full workdays for the pupils. Frequently, this is also the maximum a school can afford to spend on a project. To sustain a common level of technical quality in the final

Fig. 4 Editing of the video clip

videos, however, additional post-production work is necessary. For this, the project team is supported by student assistants experienced in film editing. They are employed to back up and manage the increasing amounts of raw video footage, improve sound quality, shorten lengthy scenes, add credits and supply subtitles or graphics to improve comprehensibility if necessary.

4 Outcome of the Project

The work in SFB Outreach imposes a steep learning curve on everybody involved. The pupils are faced with two new areas of expertise that they have to cope with, i.e. the science itself and the techniques of video production. In spite of the pervasive presence of YouTube and video on computers and smartphones, know-how with respect to planning and carrying out a video project is not as widespread among pupils as one might assume. Fortunately, after initial scepticism, acceptance for this approach has grown among the teachers, pupils and scientists involved in the project.

In total, at this point (December 2011), there are 22 completed video clips (Fig. 5) available on the project's website (SFB Outreach 2013) and some more in the final stages of post-production. So far, two videos have not been published because of potential copyright issues and three due to insufficient quality. The clips vary in length between 4 and 8 min, and presently all of them are in German. (English subtitles or even productions completely in English are envisaged in the next stage of the project). After the first 3 months since the official start of the website in September 2011, the number of online views per video clip is 130 on average, the least popular scoring 72 and the most popular 316. (Note that the videos produced in the project are not uploaded to YouTube. To retain control of copyright and to guarantee that they are freely available, they are only posted on the project's website). For technical reasons, so far the number of downloads unfortunately could not be monitored.

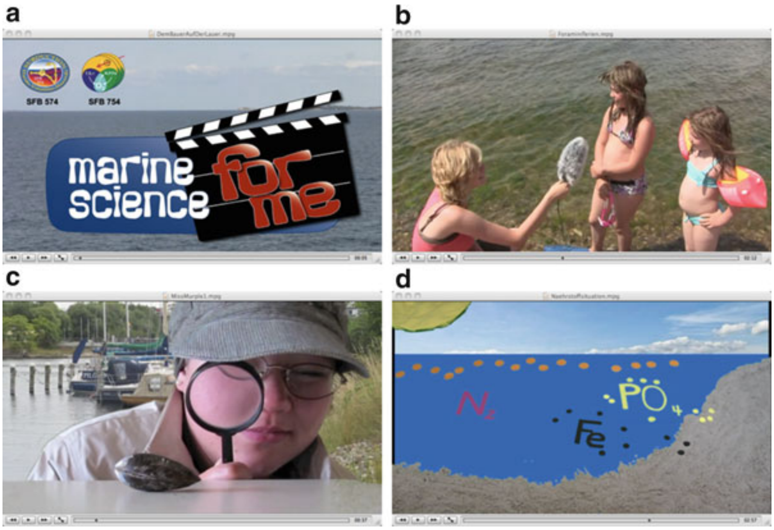

Fig. 5 Still shots from several completed videos: (**a**) Opening sequence of SFB Outreach videos; (**b**) Interview at the beach (from "Foraminiferien"); (**c**) Private eye "Miss Murple" investigating the death of a mussel; (**d**) Cartoon from "Nutrient Situation in Oxygen Minimum Zones"

Frameworks for stories range from children's TV formats (frequently involving "interview the scientist"-style segments) to love stories and parodies of thrillers. Videos are produced with live acting, puppets or – in one case – digitally animated characters. Topics cover background information on tsunami generation or plate tectonics but also specialised research methods like the use of benthic foraminifera in sediment cores as climate proxies. The choice of topic depends on the complexity of the subject itself, the availability of researchers (who all have their own special research interests) to support the pupils and – when working in the classroom context – the teacher's options for accommodating topics within the curriculum.

The outreach project is defined as an intrinsic component of the scientific consortia, and, as a consequence, scientific support is provided by all levels of staff, from principal investigators to graduate students and technicians. Many of the scientists enjoy their involvement in the video productions as long as this does not impose too large demands on their time. The total time contributed by individual researchers depends on their level of involvement in a specific video project. This may range from 4 to 20 h for a single project. Participation is on a voluntary basis and without financial compensation. Involving graduate students and postdocs frequently turned out to be even more valuable than working with senior staff, because of less severe time restrictions, the smaller age gap relative to the pupils and the chance for the pupils to address their career questions to people who had just left university. Graduate students and postdocs optionally receive certificates attesting their involvement in outreach work for reference in their CVs.

Considerable voluntary work is also contributed to the project by the schools, where teachers and pupils are involved in different combinations and for different

Table 1 Statistics of SFB Outreach's video projects between January 2010 and August 2011 (in reverse chronological order)

Video projects	Topics	Schools	Pupils	Videos	Duration
Summer school 2011	Plate tectonics; oxygen minimum zones	Various	12	3	14 days
Science in clips (4 periods)	Benthic communities; cold seeps; tracers and mixing	Freie Waldorfschule Kiel	4*15	4* (2 to 3)	4*2 months
School science project	Nutrient cycles	Ravensberg, Kiel	20	4	4 weeks
After-school activity	Temperature reconstruction from oxygen isotopes	Gymnasium Wellingdorf, Kiel	3	3	1 school year
Summer school 2010	Climate reconstruction from foraminifera in sediments	Various	15	4	6 days
Project week	Role of bacteria	Gymnasium Bad Segeberg	20	2	1 week
Ocean currents	Current measurements	Gymnasium Heikendorf	2	1	1 week
Measurement methods	Oxygen titration; spectrophotometry	Ravensberg, Kiel	20	4	1 week
Internship	Subduction	Various	3	1	1 week
Internship	Oxygen minimum zone	Various	3	1	1 week
Winter school 2010	Food chains	Various	2	2	3 days

time intervals (cf. Table 1). Five secondary schools in Kiel and surroundings have been active in specific video projects in the first 2 years, and pupils from a range of other schools were involved in summer courses and internships. After the first projects, some schools have started purchasing their own video equipment to continue this type of work.

SFB Outreach's website ("Marine Science for Me", cf. Fig. 6) constitutes a central hub for the project's visibility. The site features the finalised video clips, an archive of the press releases by both science consortia and supplementary materials for teachers and pupils such as experiment descriptions or worksheets.

A range of problems had to be overcome, mostly related to insufficient experience in video production and often enhanced by this new combination of science video and schools. There were (and occasionally still are) technical problems with editing and post-production. One of the main reasons is that the pupils often forget to store the raw footage and only deliver a fully rendered video to the project team in which errors can no longer be easily corrected. Sometimes, sound quality is miserable and the pupils are no longer available for re-recording. Also, in spite of consultation and feedback by the researchers, scientific facts are sometimes presented incorrectly. Occasionally, copyrights are infringed, or the product is simply of irrecoverable low quality in terms of pictures, sound or content. In these cases, the videos are not published.

Fig. 6 Homepage of SFB Outreach's website (in German, English version in prep)

At the moment, the scientific quality of the videos is still somewhat lower than desired due to an insufficient immersion of the pupils into the science topics. As already pointed out, for most schools, the time frame available to run a project like this is a "project week" of 5 work days. However, all attempts to fit the workload into this framework resulted in projects in which the introduction to the science, by necessity, had to be extremely brief. Since the pupils are asked to only report on science that they themselves have actually understood, the result was that often only a bare minimum of scientific explanation was incorporated into the videos. Meanwhile, other production formats are being tested that dedicate more time to the scientific aspects.

Steering the project into predefined directions in terms of a focus on certain science topics (as desired by the funding agency) proved to be extremely difficult due to the restrictions imposed by teachers' agendas (controlled by the curriculum) and the availability of specific researchers at a given time to support the project. Thus, an even coverage of all topics addressed by a research consortium cannot be guaranteed, and the growth of the "science mosaic" is frequently controlled by supply and demand rather than by a preconceived plan. For example, quite unexpectedly the topics of SFB 754 turned out to be more attractive to schools than those of SFB 574: In spite of the apparent complexity of biogeochemical interactions in oxygen minimum zones, teachers preferred these topics, probably because of the close connection to biology and chemistry in the school curriculum.

Subduction zones and volcanism, on the other hand, which were offered as the first "point of entry" into video projects for SFB 574, were hardly chosen at all. This again becomes plausible in the light of the German curriculum, in which only a small number of hours in class are allotted to physical geography before human geography starts to focus on politics, economics and society.

5 Evaluation

To be able to quantify our conclusions, after the first full school year of producing video clips, feedback was collected on how this method is received among the pupils. Questionnaires were distributed to some of the pupils participating in the production of videos, and the answers are used to re-evaluate goals and practices.

So far, the responses of 30 participants of the "Science in Clips" project (see Table 1) and 26 participants of the two summer courses were analysed. Pupils were given 2-dozen 5-point Likert items (Allen and Seaman 2007), answerable by ticking one of "strongly disagree", "disagree", "neither agree nor disagree", "agree" and "strongly agree", and they responded to several open, essay-style questions. (To simplify the presentation of results, in the following, both categories of positive and negative responses on the 5-point Likert scale are summarised into one number each and discussed in percentages of the total number of responses given). The analysis of this evaluation does not try to make any pretence at being scientifically sound, nor does the small number of samples allow any claim to statistical reliability. However, the answers confirm many personal impressions of the staff involved and provide sufficient information to allow some first deductions.

Here, we will differentiate between:

(a) A school group ("Science in Clips"), where participation was compulsory because the video project was part of regular lessons. Time available was 2 times 90 min a week (with the option of assigning additional work as homework) for a duration of 2 months (24 work hours in total plus homework). Four groups of 15 pupils worked successively on four different science topics. Activities by the pupils were graded by the teacher.

(b) The summer courses, in which participation was voluntary. Pupils had to apply for the courses and thus make a conscious choice to spend part of their vacations on this project. Time available was a block of 6 full working days (48 h) in the first and 10 half-days (50 h) in the second course. No grades were given.

5.1 Background of Pupils

Some questions examined how background and expectations may have influenced opinions. Not surprisingly, the summer school pupils who consciously chose to participate in this project seem to be more pre-inclined to its science content and

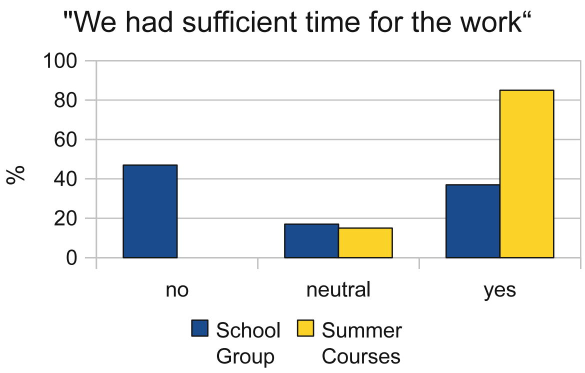

Fig. 7 Results of survey of participants, in per cent of total replies ($n=56$)

also to video production: 65 % had previously worked with video (40 % in the school group), 77 % considered their grades in sciences as "generally good" (60 % in school) and 64 % had already been interested in sciences before the project (vs. 43 %). Pupils in the summer courses were slightly younger (grades 9–11) than those of the school class (grade 12), but it is not clear if this should have implications for the replies.

5.2 *Satisfaction with Proceedings*

Happiness or unhappiness with proceedings may decide how well a project is received and thus have repercussions on the responses. Most of the pupils generally appreciated the project: In the school group, 83 % liked "learning science in this way" and 90 % enjoyed the combination of scientific content and entertaining "packaging". (These questions were only asked in the second of the summer courses and received 100 % affirmation). The overwhelming majority in both groups was quite happy with the assistance they received (73 and 92 %) and confirmed that "The introduction to the science was good" (77 and 88 %).

However, 10 % of the school group disagreed with this statement (0 % in the summer courses), and a considerable fraction at school found their science topic difficult (30 vs. 8 %).[1] In the classroom situation, time management issues also turned out to be a severe problem: Only 37 % of the pupils at school felt they had sufficient time for the task (85 % in the summer block course, Fig. 7). Twenty-three per cent thought that the requirements were too high for the available time (0 % in the summer courses) and 13 % stated that they sacrificed too much of their free time

[1]It should be kept in mind that the pupils' answers do not refer to the same introduction to science because scientists and topics were not identical for the different courses.

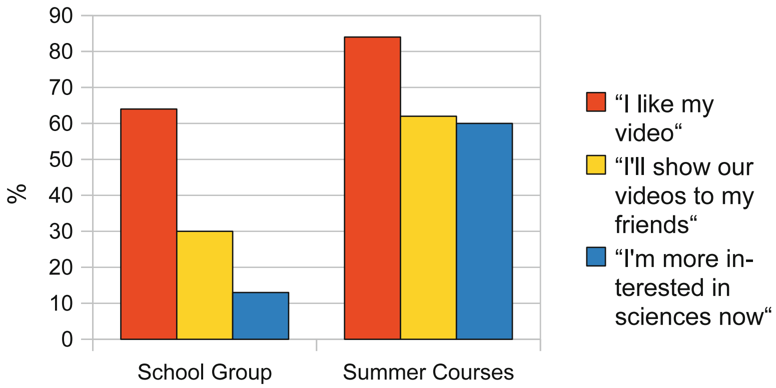

Fig. 8 Personal perception, "courage for dissemination" and change in interest ($n = 56$)

for the project. In retrospect, 20 % of the school group would have preferred "normal classes" to doing a video clip. (This situation is elucidated somewhat by the open questions, in which several pupils pointed out that they would have liked to receive a lot more in-depth information on the science. Also, the misconception that this class was supposed to be on biology led to some unrest among pupils who had to work on topics in ocean physics).

5.3 Impact

How did the pupils evaluate the results of their courses? The majority liked the video they themselves had produced (64 and 84 %). Yet, from a less subjective perspective ("I will show our videos to my friends"), only 30 % of the school group still answered affirmatively (62 % in the summer courses, Fig. 8). The – admittedly ambiguous – statement "I am now more interested in sciences" received only 13 % affirmation in the school group but 60 % in the summer courses. ("Ambiguous", because a highly motivated science pupil would be forced to say "no" if his/her level of motivation remained high).

In both groups, there appear to be positive correlations between prior interest and an increased interest for sciences afterwards and also between above-average grades in science subjects and an increased interest in sciences after the course. In the school group, no pupils at all went from "previously not interested" to "now interested", but in the summer school, 3 cases (11 %) claimed they did; 3 pupils from the school group (10 %) and 1 from the summer school (4 %) went from undecided to positive.

Only 23 % of the school group were willing to join similar projects if offered as a voluntary after-school activity (58 % in the summer courses).

5.4 Results from Essays

In the replies to the open questions, a recurring topic was the difficulty in writing a storyboard. Clearly, this is something where pupils need considerable support. However, several also felt insufficiently prepared for it because they did not have enough time to get immersed thoroughly into the science topic. This issue did not come up in the second, longer summer course, where as a result of previous experiences, more time was allotted to hands-on experiments. In the school group, the pupils also complained about the lack of cooperation of some of their less motivated teammates (a fact that also became apparent to the staff during lessons). A few pupils in the school group complained that participation in this project was not on a voluntary basis.

Positive feedback came with respect to the attractiveness of the task (i.e. explaining science in a fun way), the large amount of creative freedom the pupils had and the positive team experience that was present in many (although not all) teams.

5.5 Additional Observations

Contrary to expectations, the pupils frequently turned out to be "conservative" with respect to experimenting with new formats in storytelling. Instead of striving for originality and coming up with new ideas, quite often they tried to reproduce well-known TV formats (e.g. interviews with scientists, documentaries or children's science programmes). Although not completely in the spirit of the project, in the initial phases, this "quick and easy approach" was acceptable to get started because technical issues required a considerable portion of the available time. Meanwhile, however, more time is dedicated to the creation of "more adventurous" styles and storyboards. Positive examples include a "silent movie", a video clip set completely in black light, a love story between two species of zooplankton, and a "Mission Impossible"-type story about tagging water masses in the ocean with tracer substances.

Closer scrutiny of the videos so far produced shows that pupils still tend to perpetuate some of the common stereotypes of scientists. Even researchers whom the pupils only met in street clothes are deliberately portrayed in white lab coats "to make it easier for kids to identify the scientist" (Fig. 9). On the other hand, instead of the typical "male scientist", we now frequently encounter girls impersonating a female scientist, indicating that their perception of science is no longer entirely dominated by male representatives.

Further evaluations will be carried out with participants after the second school year. In addition, as more clips are becoming available on the website, the need now arises to survey and document how they are being received and used by the target groups. To what extent do teachers introduce them into their classroom? Are pupils showing them to their friends? For this, additional feedback mechanisms will be set up to allow communication with the audience.

Fig. 9 Pupil impersonating the stereotype of a scientist for a video clip

6 Conclusions and Lessons for Future Work

The first phase of this project demonstrated that the joint production of scientific video clips with pupils and researchers is feasible and can be profitable for the participating schools as well as the research institute. The teaching at school is enriched by the new focus imposed by this product-centred, hands-on learning, and the scientists discover new ways of communicating geosciences. Nevertheless, this approach has a steep learning curve; it is time intensive and requires considerable resources in terms of equipment and manpower. (The largest single cost factor being a position for a person coordinating all these activities and providing the necessary know-how).

Involving pupils on a voluntary basis (e.g. in after-school activities or summer schools) attracts participants with higher motivation and yields better results than "forced labour" imposed within the framework of regular school work. The hope that these projects might win over pupils who had no previous interest for sciences does not seem to come true in the majority of cases. However, pupils who were already inclined to sciences tend to get confirmed in their interest, which will ideally encourage a decision to choose a career in geosciences. For a research institute thinking about engaging in this kind of activity, the obvious conclusion would be to only work with selected pupils who have to apply to participate. This is legitimate if the research institute can manage a video project on its own. However, in cooperation with schools, this approach is not always possible because teachers have the task of reaching all their pupils and not just a select few.

Although the first video products cannot aspire to qualify as highlights of scientific journalism, they do show the potential of the medium. Quality varies between different productions, but as experience accumulates, the focus of the work gradually shifts from tackling technical issues of video production to directing the creativity of the participants towards more originality and improved scientific content of the video clips.

The ultimate appeal to target groups remains to be seen, but feedback from the pupils, teachers and scientists involved in the productions as well as from visitors at first public screenings of the videos is largely positive. Successful videos are recommended to friends, family and colleagues, and they are beginning to be appreciated by teachers as an alternative to standard textbook material for introducing new science topics in school. Quite unexpectedly, test screenings to research staff showed that even graduate students enjoy the videos because they offer a simple first step into some of the more complex interdisciplinary topics of the research consortia.

The first video clips published on the project's website immediately generated a demand for further information to accompany them. While the videos incite curiosity, supplementary written material is required to explain the topics more in depth. Thus, new video projects will make an attempt to include a "documentation" component from the very beginning.

To the initial disappointment of the research consortia, it turned out to be impractical to convince the schools to focus their videos only on those research results that were new and ground-breaking. Meanwhile, however, the highlights of the consortia's research are beginning to show up in the emerging video-mosaic nevertheless. When the researchers present their latest results to the pupils with obvious excitement, the pupils recognise that this must be "cool stuff" and adopt it for their videos with great enthusiasm. In this way, the transfer time of several years that is usually required for new research to make it from the scientists to the schools is reduced to a few months.

Overview

Background and Motivation

– SFB Outreach communicates the research background of two research consortia in ocean sciences to schools and via its website to the broader public.
– Together with scientists, pupils from secondary schools produce "edutainment" video clips on research topics.
– Videos are presented on a dedicated website in "YouTube style": short, original and addictive.

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Innovations and Findings

– In 2 years, various projects with groups of pupils or whole school classes have been carried out, varying in length from a few days to a whole school year.
– At present, about two dozen video clips are available on sfb-outreach.geomar.de and new productions are underway.
– The topics covered range from "tsunami generation" to the "use of benthic foraminifera in sediment cores as climate proxies". Presentation styles include love stories, newscasts or children's TV formats.

Implications for Wider Practice

– The feasibility of the approach has been successfully demonstrated, but it includes a steep learning curve for all partners involved.
– From feedback to the first projects, lessons on improved strategies can be derived, e.g. with respect to minimum time frame for individual projects and recruitment of pupils.
– The project primarily attracts pupils already interested in geosciences; it confirms them in their interest and motivates them to further pursue sciences.

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