SciCamp: Science Holiday Camps in Europe (Comenius Project)

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Abstract

The lack of scientists and technicians is an EU-wide problem. As one solution for this in many countries summer camps were established, having two main objectives: recruiting more young people for a career as scientist or technician and increasing the scientific literacy. The impact of summer camps on career decisions are not yet researched, but evaluations show a broad acceptance of these events. Facilitating positive experience for young people in science and technology is one (of the best) ways to increase interest in these careers [1].

Most summer camps are designed to provide positive learning experiences for the participants, strengthen the intrinsic value that youth put into science, and increase the awareness of the diverse opportunities available in science, technology and health. It has been stated that cook-book activities have a small or even a negative effect [2, 3]. As summer-camps allow a much more open approach they offer a much more constructivistic learning of science and technology. It might be interesting to discover an effect on gender according to this fact.

The SciCamp project lasts from December 2012 til December 2015. We would like to research on the long-term effect of summer camps through interviews, questionnaires and follow-up data collection. As our project group conducts summer camps since years, we are able to follow the participants from former years, who in some cases made their career decision and already started the vocational training or university studies.

Also we collect and analyse the specific characteristics of science camps such as location, staff, time, programme, entertainment, target group, collaboration with local organisations and funding.

The SciCamp project has the following four core areas. (1) Exchange for organizers about planning, experiences and best practice. (2) Evaluation and research of the impact of the activities on the participants. (3) Discussion on economic aspects of science camps such as fundraising, staff costs and reduction of costs through collaboration. (4) Sustainability, suggestions for classroom activities, links to local SMEs and industry and contact between school and higher education. Our partners are the "ELHUYAR Foundation" (Basque country), "Centre for the Promotion of Science" (Serbia), "South Denmark University", "ScienceTalenter" (Denmark), "Fundação da Juventude" (Portugal) and the "Young Scientists of Slovakia".

1. Introduction

Employment within science, technology and health sectors is expected to grow in the next decade. Promoting awareness of the many career options available in these fields is important for today's youth.

The lack of technicians is seen to be not only a national, but also an EU-wide problem and a competition among the economical centres of the world [4]. As one result of this problem many summer camps were established through various organizations. The objective of these camps is not only to recruit more young people for a career as scientist or technician, but also to rise the scientific literacy [5]. In many EU countries various organizations (companies, universities, science centres and public organizations) are conducting (science) summer camps. The number of especially scientific summer camps has been growing over the last decade.

Most summer camps are designed to provide positive learning experiences for the participants, strengthen the intrinsic value that youth place on science, and increase the awareness of the diverse opportunities available in science, technology and health. The principles used to reach these goals is to allow youth to interact with positive role models, student centred teaching, and connecting science, technology and heath to the live of youth [1].

In summary most summer camps are driven by the wish to activate and engage students and to convince them through fascinating experiments, laboratory work and the contact with experts to an education within science, technology and health.

2. Background

Research on Science, Technology, Engineering, and Mathematics (STEM) focused mainly on out-of-school teaching parallel to regular school periods. It showed an effect of any activity on learning and learning outcome, but not yet on career decisions. Retrospective research of those students who chose technical studies or jobs in technology and science showed a similar effect: those students who had already been engaged in science camps or extra-curricular science activities report, that they had been interested before [6]. Research on learning in labs shows an effect on the student's interest, knowledge and motivation to deal with questions of Science and Mathematics [7, 8]. These labs are usually visited for one day. The impact of summer camps on career decisions are not yet researched, but questionnaires show a great acceptance of this event. Facilitating positive experience for youth people in science and technology is one (of the best) ways to increase interest in these careers. Positive experiences are thought to promote confidence with and positive attitude towards science and technology [1].

In their examination of the influence Vickers, Ching and Dean (1995) concluded that summer science programs featuring hands-on science activities are a highly effective way to increase both interest in science and technology.

The evaluations of science summer camps conducted to date have tended to be either anecdotal or limited to the analysis of a single camp program [1]. No approach has been taken to compare the various activities and to evaluate these activities in the long run to evaluate how and in which way science summer camps effects attendee.

Through interviews, questionnaires and follow-up data collection we would like to research on the long-term effect of summer camps. As the group conducts summer camps since years, we are able to follow the participants from former years, who in some cases made their career decision and already started the vocational training or university studies. These persons will be targeted by questionnaires and – in fewer number – by interviews. Research is focussing on interest, motivation and retrospective on the career decision to get data about the function of the summer camps on individuals.

The methods are psychological methods focusing on interest and motivation [10, 11] and on the self-concept of the persons [13]. Another question is, whether the methods used in summer camps influence the interest and the long-term effects. It has been stated that cook-book activities have a small or even a negative effect [2, 3, 13]. As summer-camps allow a much more open approach than students labs they offer a much more constructivistic approach towards science and technology. It might be interesting to discover an effect on gender according to this fact.

3. Characteristics of science holiday camps

Special Location

Usually science holiday camps are located in an interesting surrounding, like research institutions, hostels in a nice landscape, companies´ training centres or hotels for young people. The location is one of the attraction of a science holiday camp. Only very few camps take place in schools.

Staff

The staff usually is recruited by the institutions offering the science holiday camp. Most of the staff was not trained as teachers. Some are retired persons who join the camp trying to convince young people. Often the staff is completed by young members of the organizations, who function as role models.

Time

One of the most convincing aspects is the length of time used for the activities. Science holiday camps last usually one or two weeks with full day activity. These amount of time is very often seen as a relaxing fact which helps to deal much more intense on science questions. The relaxed atmosphere of holidays plays an additional role on the well performance of science holiday camps.

Programme

The programme consist of all activities connected to science education, like excursions, lab activities, discussions with experts, interviews, internet recherche, lectures etc. The enlarged time schedule (compared to regular classroom teaching) allows the research work with inquiry based methods. This includes the rising of questions with relevance for the students, an open approach toward research

orientated problem solving and the finding of results which are able to answer scientific problems and which help developing positions based on scientific facts.

Entertainment

As scientific science holiday camps are placed in holidays, the students expect an aspect of entertainment. Parts of the scientific programme or excursions are holiday-like entertainment for themselves (like canoe-trips for bird watching) but some courses are bound to buildings to that explicit entertainment activities are embedded.

Target group

Science holiday camps are designed for all ages. Already children are targeted with respect to the wish to offer an early contact to science and technology. The main focus group are young people closer to their career decision. Some scientific science holiday camps are directly focused on girls or as special courses for gifted students.

Collaboration with local science and technical organizations

Usually science holiday camps are organized in collaboration with local science or technical organizations. Science centres, universities, SMEs or Industry are usually involved and offer excursions, guided tours or discussion with experts. Sometimes the partners offer their labs or workshops to let students work there and make their own experience or investigation.

Funding

The funding is either organized by the centre holding the science holiday camp, by sponsors, by public funding or – partially – by the parents of the participants. Funds of sponsors are usually not predictable and are offered from year to year, but also public funding is not necessarily continues. After all funding remains as a problem to be solved by the organizers of science holiday camps.

4. Objectives of the SciCamp project

The Comenius project has 4 core areas.

1. Exchange
- Coordinating organizers of scientific science holiday camps
- Exchange of ideas about planning and experiences of science holiday camps
- Sharing best practice in conducting and organizing science holiday camps

2. Evaluation and research
- Establishing a methodology to evaluate the impact of the activities on the participants

3. Financial aspects
- Discussion on economic aspects of science holiday camps
- Fundraising
- Personal costs
- Reducing costs through collaboration

4. Sustainability
- Extraction of basic pedagogical facts for successful activities
- Formulating suggestions for classroom activities in schools
- Recommendations for further holiday camps
- Building and strengthening links from science holiday camps to local SMEs and Industry
- Establish contact with third phase education in science and engineering (universities, colleges, technical universities, vocational trainers)

5. Work packages

WP 1 Management

Management of the whole project, organizing conferences, organizing publications, establishing contact to possible stakeholders of new science holiday camps and intensify contact to partner projects in EU-Programs.

WP 2 Exploitation

Exploiting existing science holiday camps in various aspects: organization, program, collaboration with regional stakeholders like universities, colleges, industry and companies (focus on SME). This work package includes a survey over existing science holiday camps in the participating countries as well as other European countries. The survey focus on organizational, financial, program-related, pedagogical and collaboration-related aspects.

WP 3 Best Practice in Collaboration

Developing a publication of best practice on collaboration of science holiday camps with stakeholders, schools, parents, external education partners, science contests etc.
The work package contribute to a series of collaboration workshops among partners who are working together in conducting science holiday camps and those who are interested in joining in. Due to time and financial restrictions this could not be done Europe-wide, but in 4-6 regional conferences. Driven by the results of WP2 a publication is prepared combining best practice examples as models for successful work. The philosophy of the workshops could be described by collaborative construction. Every partner joining will contribute its own aspect on science holiday camps. These aspects are shared on an equivalent level, in a way everyone is an expert (communities of practice).

WP 4 Evaluation and Research

Research is focussing on two things:
- How are the participants affected by joining the science holiday camp?
The content of the research on this issue has already been discussed in the "Background".
- How is collaboration organized?
The various forms of collaboration of the organizers of science holiday camps will be researched in case studies, using methods of sociology. The methods are summarized under “educational governance” and include network-analysis, distribution of information, duration of collaboration, hierarchy etc. [14].

WP 5 Distribution and Implementatio

The results from WP 2-4 are distributed through an interactive website available via http://www.sciencecamps.eu. The website will be developed gradually through the lifetime of the project. Additional to this the results will be published on national and international conferences, will be fed into networks of science holiday camp organizers.
WP 2 (Exploitation) will organize national network and a transnational network from the data we gain from exploiting existing science holiday camp activities from the partner countries as well as from other countries.
Finally local conferences for stakeholders will be organized to share the results of WP 2-4 with those who are already engaged in science holiday camps as well as those persons who plan to create new science holiday camps. The 1st conference will take place in Belgrade at the beginning of October 2013. The other conferences will be held in Spain (2014) and Germany (2015).

6. Participants of the SciCamp Project

- Martin Luther-University Halle-Wittenberg: Martin Lindner (Germany)
- University of Southern Denmark, IMADU: Linda Ahrenkiel (Denmark)
- ScienceTalenter DK: Hanne Hautop (Denmark)
- Elhuyar Fundazioa: Maria Gil Rodriguez (Spain / Basque Country)
- Center for the Promotion of Science: Belgrade:Aleksandra Drecun (Serbia)
- Fundação da Juventude (Youth Foundation): Susana Chaves (Portugal)
- Young Scientists of Slovakia: Ján Šípoš (Slovakia)

7. References

[1] Crombie et al, 2003: Positive effects of science and technology summer camps on confidence, values and future intentions (Europe needs more scientists, 2004).

[2] Hofstein, A. & Lunetta, V. N. (2004). The Laboratory in Science Education: Foundations for the Twenty-First Century. International Journal of Science Education, 88(1), 28-54.

[3] Hodson, D. (1993). Re-thinking Old Ways: Towards a more critical approach to practical work in school science.

[4] Europe needs more scientists, 2004: Report of the High Level Group on Increasing Human Resources for Science and Technology in Europe. European Commission, Brussels.

[5] OECD 2003: The PISA 2003 Framework – Mathematics, Reading, Science and Problem Solving Knowledge and Skills.

[6] Schaef, A. 2011: Die Bedeutung von Arbeitsgemeinschaften im naturwissenschaftlichen Bereich für die Entwicklung der Berufswahl. (The role of science workshops for career decisions). Examensarbeit Univ. Halle, unpubl.

[7] Glowinski, I. 2007: Schülerlabore im Themenbereich Molekularbiologie als Interesse fördernde Lernumgebungen (Students´ labs concerning molecular biology fostering interest). Diss. Univ. Kiel.

[8] Pawek, C. 2009: Schülerlabore als interessefördernde außerschulische Lernumgebungen für Schülerinnen und Schüler aus der Mittel- und Oberstufe. (Students´ labs fostering interest in out-of-school education of lower and higher secondary students). Diss. Univ. Kiel.

[9] Vickers, M., Ching, H.L., and Dean, C.B. "Do Science Promotion Programs Make a Difference?" Proceedings (Papers and Initiatives), More than Just Numbers Conference, University of New Brunswick, Fredericton, N.B., E3B 5A3, 1995.

[10] Krapp, A. (2000). Interest and human development during adolescence: An educational-psychological approach. In J. Heckhausen (Hrsg.), Motivational psychology of human development (S. 109–128). London: Elsevier.

[11] Krapp, A. (1999). Interest, motivation and learning: An educational–psychological perspective. European Journal of Psychology in Education, 14, 23–40.

[12] Shavelson, R. J., Hubner, J. J. & Stanton, G. C. (1976). Self-concept: validation of construct interpretations. Review of Educational Research, 46, 407-444.

[13] Harlen, W. (1999). Effective Teaching of Science - A Review of Research. Edinburgh:
Scottish Council for Research.

[14] Kussau, J, Brüsemeister, T. 2007: Educational Governance: Zur Analyse der Handlungskoordination im Mehrebenensystem der Schule (Analysis of action coordination in the multi-level school system). In: Altrichter, H., Brüsemeister, T, Wissinger J. (Eds): Educational Governance. VS Verlag, Wiesbaden.