

Ten Typical Weak Points in Parallel-to-School Science Education of Highly Motivated Teenagers

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Abstract. Here the author presents some the most frequent problems that appear in a number of science camps, workshops, and summer schools prepared in order to support gifted and talented students. Many such problems are typical and could be eliminated if organizations or teams involved in such programs spend certain amount of time and efforts in mutual communication and exchange of information and experience. Some problems are result of the lack of co-operation between teachers or experts interested to help students in certain field of science or technology and people with knowledge and experience in teenagers' team work, group life and behavior, such as psychologists, pedagogs, trainers, etc.

Keywords. Gifted education, Science camps, Science education.

Introduction

In many countries worldwide youth camps are traditional form of extracurricular activities or just for safely send children far from parents to spend a week or two with other children of similar profiles of interest. The organizers could be many types of organizations, groups, schools, churches, local communities, or even industrial companies. Some camps are with long tradition, and one can expect with high accuracy what exactly on each day will happen there and what typical problems can occur and how they will be solved. There are also a number of camps organized for the first time. Here, the lack of tradition is often compensated by the attractive advertizing.

Contrary to long tradition in regular schools where curricula and school rules are precisely defined, in most cases through state laws, typical youth camps are based on good will of enthusiastic organizers and their previous experience. Because of such "liberal" atmosphere, we can find a colorful landscape of various types and forms of youth camps. At the same time it is possible to find ingenious projects and something similar to old-time village schools or boy-scout camping place.

In this paper the author is focused on youth camps in Science which are more and more popular in the recent years in many countries. Like the majority of other types of youth camps, the most of science camps are positioned in the summer time and offer a combination of learning, practical work, plus recreational and social activities. Many such camps are faced with typical dilemma – more challenging science program which

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understand narrow group of potential participants, or simply, more popular activities ready to be attractive for broaden spectrum of children. The result is, in many cases, a kind of oscillation between these two extremes with not enough risk to experiment looking for optimal structure of activities. It is also a common practice that the limited structure of teachers or enthusiastic scientists are involved in preparation process with rarely contacts with specialists in children psychology or people experienced in youth camps of other profiles, such as sport, art, environment, or specialized youth organizations such as scouts that have rich experience in various type of youth camps and gatherings.

The author uses his thirty years long professional experience in youth science camps and contacts with a number of organizations and people actively involved in similar activities to list some the most frequent problems that occur in youth science camps in order to help existing or future organizers to be aware of some typical problems.

1. What Organizers want to Make

There are some general objectives that the most of organizers wish to fulfill:

- a) Safety – the camp must be safe for all participants. Any risk for injuries or any type of accidents must be eliminated.
- b) Satisfaction – it is important that participants will be satisfied with the program in order to spread the positive impressions to other possible participants or to the people who can influence new participants such as teachers or parents.
- c) Positive financial balance.
- d) To make camp better than previous camp or camps organized by others.

All above objectives cause some constraints.

Worrying about safety could eliminate some of the most attractive and the most effective activities such as lab experiments, some kind of field works, direct contacts with animals, free social interactions and events, free and individual access to some sorts of equipment, etc. In recent years in a number of countries rigid safety regulations endangered science education in schools and many practical training.

Preoccupation with participants' satisfaction also can minimize some important learning methods and eliminate all types of activities which imply some level of risks that somebody could not reach the top results, or be faced with living, social, or working problems. Such programs become sterile, opportunistic, and therefore non attractive for the most promising and gifted participants.

Well constructed financial balance is reasonable imperative for the most of organizers, but it implies that the normal solution must be that the program should not start if the optimal budget for the minimal acceptable program structure is not completed. It is more realistic than to expect to obtain minimal budget for the optimal program.

The last of above general expectations is rather emotional than rational, but it could produce some serious problems. One typical is an intention that, for any price, something new (and not proven or at least not well prepared) must be included into a camp program. The other problem arise when organizer recognizes some element of the camp's program or activities, that has been very effective and successfull in previous camp(s) or in other comparable camps, and forces it to become the central part of the entire camp's

program. In both cases the result is changing the „science camps scene“ into something chaotic where too many „innovative“ camps are offered to public ignoring the existing good practice or excellent results of some „traditional“ camps and, of course, the fact that both schools and parents don't like experiments – they want to be sure about the qualities, structure, and the program of announced camps.

2. Classification

Here, the author tried to introduce several criteria where the most of camps could be grouped.

- a) Youth science camps according to dominant profile of activities
 - i. Lecture-based camps, i.e. camps where lectures are prevalent type of activity. In the most of cases, this type is the simplest for preparation and organization.
 - ii. Project-oriented camps, i.e. camps where the core activity is participants' practical work, including lab work, field work, construction work, research, etc.
 - iii. „Let make it“ camps, i.e. camps where until beginning of the camp is not clear which activities will prevail. Because of weak preparation, often happens that both organizers and participants do not know what will be tomorrow working agenda – it depends of good will of visiting lecturers or external people including just their coming and presence. In some cases weak preparation is just the result of small budget.
- b) Participants' profile (I) – Motivation
 - i. Already devoted to Science
 - ii. Just curious or not yet clear about the career expectations or field of interests.
 - iii. No special criteria
- c) Participants' profile (II) – Knowledge and experience
 - i. Average school-level (including “bellow school-level”)
 - ii. High school-level
 - iii. Talents
- d) Participants' profile (III) – Preparation
 - i. Prepared for the program. In some cases preparation take place in the school.
 - ii. Unprepared
- e) Program profile
 - i. Narrow (e.g. „DNK mapping techniques“ or „Binary star spectrometry“)
 - ii. Discipline-based („Summer Camp on Physics“)
 - iii. Broad („Summer Science School“)
- f) Generation scope

- i. Extremely broad (10+ yrs of age difference)
- ii. Broad (4-10 yrs of age difference)
- iii. Narrow (up to two years). Typically linked with certain school grade.

g) Leaders+facilities profile

- i. Full professional staff. Their dominant job is organization of youth camps and similar activities.
- ii. Semi-professional. School teachers are within this category.
- iii. Youth-to-youth. Something close to scouts.

h) Duration

- i. Short camps/workshops/conferences/meetings/campaigns (up to 4 days)
- ii. Medium (5-13 days)
- iii. Long (14-28 days)
- iv. Very long programs (more than 4 weeks)

Just to be clear – in any of above listed categories, we can find very good and very weak camps. **Category doesn't imply quality!**

Now it is possible to list some typical mistakes caused by imbalance between certain categories:

- Unclear category. It could dramatically increase costs and complexity of preparation, application procedure, and camp management.
- Imbalance between expectations and abilities. It could be applied both for participants and organizers.
- Underestimation of participants knowledge and expectations. Here, I don't think that overestimation is something problematic in the case of science camps (in sport camps it could be dangerous!). In the most cases demanding program could pull participants to test their hidden abilities. Typical existing school system suppress children real abilities.
- Too much improvisation. Some level of improvisation is always welcome. It makes camp flexible and increase feelings among participants that they can influence the program.
- „Hyper-detailed preparation“. It is impossible to forecast everything. Too much details means, by definition, that something big is ignored. See above!
- Obligations toward sponsors are dominant over respecting participants' expectations. This is something subtle, but dangerous. If the camp is designed for clever and even talented children, they will easily recognize that the function of the camp is not to support their needs and expectations, but to fulfill sponsor's requirements. The result could be disastrous.
- Not well established rules, limitations, and managing hierarchy. Anarchy among teenagers is a nightmare for everybody.
- Weak understanding of teenage psychology and social behavior. Camp is not an extension of school.

- Ignoring the function of experience accumulation and sharing. There are many groups and organizations involved in design, preparation, and organization of camps who are close to each other (geographically or in time), but which do not communicate, or even know anything about others except a name.

3. Generalization of Problems

Here is a synthesis of some the most frequent problems (as author concluded) that could be used as a kind of a guideline in evaluation procedures. It could be a useful tool for camp organizers, before all.

- =1) „This is not I’ve expected!“ problem, i.e. participants are not sufficiently prepared and informed about the complete program, activities, facilities, and regulations.
- Because it is not clear even to organizers.
 - Because there are too many improvisations.
 - Because underestimation of personal qualities of participants.
- =2) Narrowing the scope of the program
- Teacher’s scope of interest is dominant in the program design.
 - Teacher avoids some important topics because of limited knowledge or resources.
 - Facts dominant over concepts, principles, and processes.
 - Topics and activities are too much linked with the school curricula.
 - Certain field of science is presented as completed and closed instead as something opened and challenging.
 - Imbalance between theoretical and practical activities.
 - Disciplinary boundaries are too rigid and dominant.
- =3) Unclear participants’ selection criteria
- Group inhomogeneity according to motivation, expectation, and background knowledge.
 - „Open doors“ philosophy (everybody is welcome) demotivates the most promising participants.
 - „Why I am here?“ problem.
- =4) „Hyperfocusing“ on the knowledge enhancing
- Underestimation of other participants’ needs and expectations.
 - = Not enough room for practical work, social activities, recreation, creativity space, etc.
 - Experienced colleagues and psychologists/pedagogs are not included in the program design and preparation.

- =5) „Opportunism“
- Too many *ad hoc* solutions of typical running problems.
 - Ignored problems could rapidly increase and explode.
 - „Class differences“ among participants (favorization beyond principles).
 - Making of some participants “stars” could demotivate others.
 - The other side of political correctness. Young participants could easily discover that some “bright leading principles” are just an artificial cover for some ambitions, but not for deep understanding of related problems.
- =6) Focus alteration
- Favorizing demands/expectations of sponsors, politicians, publics, etc. over the basic program goals and objectives. (“Everything else is more important than participants and their expectations and needs”).
 - Too many guests, visitors, media, etc. could interrupt activities and make participants nervous.
 - Spending too much money in side activities. It is dangerous if participants conclude that organizers save money for science activities, but spend too much money for other not-essential (according to participants) programs and costs.
- =7) Underrating qualities of school
- = Many science (and not only science) camps advertize their qualities using criticism of local school system. It could help in attracting some participants (directly or by attracting parents who are *by definition* not satisfied with school system), but it could weak relations with school teachers and schools. Camp promotion is much better if organizers present what they will do, not by explaining what other do not.
- =8) Glorification
- = Overestimation of results of current camp will increase expectations for the following one maybe above the level of organizer’s power. It is wise to be moderate and increase quality of camp carefully and gradually, year-by-year.
- =9) Self-sufficiency
- = No need to be informed about other similar camps. It can happen that the participants are much more informed about some other camps than the organizing team. The result could be repetition of mistakes and problems, loosing external supporters, lecturers, and collaborators. The result also can be that the general position of youth camps in certain region or country (e.g. related to the financial support from public funds) weakens because fragmented and non-consolidated links between camp organizers.
- =10) Discontinuity
- = Continual, year-by-year programs make further support easier, increase number of interested teachers, schools, and participants, and accumulate experience. School-teachers like to co-operate with camps that last many

years, because they can motivate some children promising them to be candidates for next camps. Irregularity decrease confidence.

4. Conclusions

There are many, and each year more and more youth science camps of various types and profiles. Among them there are many innovations, brave initiatives, and creative ideas. Unfortunately, because of lack of efficient links and communications, the majority of these camps are not informed about others, and there is insufficient aggregation of experience.

This paper is prepared in order to help camp organizers to recognize some, maybe at very moment hidden problems and challenges. The author is aware that the paper is based on limited information. The problem list presented here can be improved, but this is the clear intention of the paper.