

Important Social and Academic Interactions in Supporting Gifted Youth in Non-Formal Education

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Abstract This study investigated how 16–19-year-old international gifted youth felt that a non-formal educational program in math, science and technology, called the Millennium Youth Camp, supported them and what kind of long-term impact did it have on their lives. In the first part of the research, 88 international students answered an open-ended questionnaire about their opinions on the non-formal program. According to content analysis, the two most important aspects of the non-formal educational program were (i) social interaction between each other and the experts and (ii) academic activity and support. The second part of the research was conducted a year after the camp by an online survey, in which the attendees wrote an essay on how the experience had affected their lives. The content analysis of the essays indicated that the experience had a long-term impact on how the students saw themselves and their future. Based on the findings, it is outlined what principles should be implemented into non-formal learning in order to support the gifted.

Keywords: Non-formal education, gifted education, support, meaningful learning, youth, inquiry-based learning

1 Introduction

It is evident that from an early age on some students achieve better than others in science and mathematics (Subotnik, Olszewski-Kubilius, & Worrell, 2011). When one of these high-achieving individuals strives even related to other high-functioning individuals, they are a manifestation of giftedness (Subotnik et al., 2011). During the past decades, giftedness and its causes have been studied much and giftedness has been given many definitions (i.e. Subotnik et al., 2011). In 1986, Sternberg and Davidson edited a volume in which more than a dozen authors gave their conceptions of giftedness or discussed different variables of giftedness that they found important. In 2005, a new edition of the book was published, showing an increase in the amount of concepts (see Sternberg & Davidson, 1986; 2005). The difficulty in reaching a consensus on the meaning of giftedness is therefore evident (Subotnik et al., 2011). However, in many of these concepts, similar things are taken into consideration, namely non-cognitive aspects (e.g. motivation, control expectations, self-concept), and social moderators (e.g. environment, family background) and performance-related variables (Sternberg & Davidson, 2005). In this study, when referring to gifted students, we mean students who are high-achieving in math, science or technology and have shown that they are highly motivated.

Though the definitions for giftedness are vast, most researchers will agree that supporting the gifted is seen as important (Bliuc, Ellis, Goodyear, & Hendres, 2011). To mention some of the reasons, gifted students often feel that their educational, emotional and social needs are not met in schools (Adams-Byers, Whitsell, & Moon, 2004) and they tend to perceive their giftedness as a positive or negative thing, depending on how others see it (Tannenbaum, 1983).

Based on previous studies, an ideal learning environment for the gifted students is one that supports holistic learning (Tirri, 2011; Tirri, 2012). Education should acknowledge the social and emotion needs of the gifted and support the students' personal growth (Tirri & Kuusisto, 2013). Social support can affect educational outcomes depending on whether the people around the gifted student value or devalue academic effort and achievement (Bliuc et al., 2011). Also the role of community has been emphasized by students as an important part of their learning, including a community with both teachers and like-minded friends (Tannerbaum, 1983). Furthermore, gifted students require a curriculum that contains advanced content (Colangelo, Assouline, & Gross, 2004) that reflects their interest (Subotnik et al., 2011) and allows them to advance in a faster pace (Colangelo et al., 2004).

There has been debate on whether gifted adolescence should be put into homogenous study groups or not. Adams-Byers et al. (2004) studied gifted youth's opinions about homogenous groups and found that 75% of the gifted youth supported homogenous groups, the main reason being that the students felt that homogenous groups support their learning. However, other studies suggest that gifted youth do not perceive being in a social group with normal youth as a negative thing (Adams-Byers et al., 2004). On the contrary, they find that being in a homogenous group increases competition and does not prepare them well for the heterogeneous world (Adams-Byers et al., 2004). As the line is not clear-cut, rather than putting gifted students into homogenous groups in classroom settings, one option is to support them through extra-curricular activities.

One way to support the gifted is through non-formal education (Tirri & Kuusisto, 2013). However, not much research has been done on what kind of non-formal education gifted youth find important. In this research, we are interested in observing non-formal education from the perspective of gifted students. The first section of the paper will look at previous research on giftedness and non-formal education and from there build a case on why non-formal education is important for gifted youth. We will then look at how non-formal education could be improved to meet the needs of gifted students and what kind of long-term impacts can it have on the gifted students. We will look at these two issues by answering the following research questions:

1. What aspects of non-formal education do gifted students find important (*part 1*) and
2. What kind of impact does meaningful, non-formal education have on the lives of the students (*part 2*).

1.1 Nature of non-formal learning

In the 1960s, the term “non-formal education” was introduced to signal a need to create out-of-school education in order to respond to new and different demands for education (Belle, 1982). Originally, non-formal education was aimed to reach out to those who did not have the opportunity to attend formal education. Nowadays, however, non-formal education is used for many other purposes as well, such as educating a particular group of students (e.g. gifted) in a particular field (e.g. sustainable development) (Finland's Science Education Centre, 2012).

Non-formal education can be anything from a camp to a fieldtrip (Eshach, 2007) or a project done online (Schwier & Seaton, 2013), and it differs from formal education in a number of ways. The most easily notable differences are that non-formal education happens outside of school, is usually voluntary and learning is usually not evaluated (Eshach, 2007). Though non-formal education is usually prearranged, as is formal education, it is not restricted to any national guidelines, such as a curriculum (see Eshach, 2007). This makes it possible for non-formal education to concentrate on issues not dealt with in school, making it an ideal way to teach multidisciplinary fields, such as sustainable development taught at the Millennium Youth Camp.

Though the benefits of each type of non-formal education can vary depending on the course outline, one of the greatest benefits of non-formal education is the fact that it can positively affect the attitudes and motivation of the students involved (Pedretti, 2002). For instance, Pedretti (2002) stated that non-formal education in the form of scientific fieldtrips or trips to science centers can generate a sense of wonder and interest towards science, as well as an increase in enthusiasm, motivation and eagerness to learn. These attitudes can persist over time (Rennie, 1994; Rhodes, 2013) and result in further engagement in science activities (Germann, 1988). Other benefits include the social interactions that take place during non-formal education (Gilbert & Priest, 1997) and the construction of knowledge that happens when students interact with each other and teachers on issues that require reflection on interpretations of experiences (Rahm, 2004).

Non-formal learning can also be conducted online. However, research on online non-formal learning is close to non-existent. Schwier and Seaton (2013) have recently studied students' behavior in formal and non-formal online courses. In their study, they found that participants in the formal program communicated more with each other, and their conversations were more intense, than the conversations in the non-formal program. Though these findings are affected by program requirements, it does suggest that online non-formal education does not in itself meet the social needs of the students.

1.2 Effects of non-formal education for the gifted

Non-formal educational programs for the gifted usually have several things in common, namely, an accelerated curriculum, dedicated organizers, peer interaction with other students of similar ability and a supportive and encouraging environment (Olszewski-Kubilius, 2003). In addition to meeting the academic needs, activities often also promote social growth and peer acceptance (Lenz, K., & Burruss, J. D., 1994).

Studies have shown that summer programs such as camps have positive effects on gifted youth. For instance, Rinn (2006) studied 140 gifted students during a 3-week residential summer program and found that both males and females experienced a significant increase in their perceived peer relations. Long-term benefits are also largely positive and include an increase in self-confidence, motivation, and basic thinking skills, as well as in autonomous learning (Moon, Feldhusen, & Dillon, 1994). A 4-year longitudinal study by Thomas (1989) also showed that participants experienced an increase in academic achievement, interest in learning and ability to get along with peers and adults after the camp. An increase in self-esteem was also noted in his study.

Though research on non-formal education is abundant, the research on youths' perspectives towards non-formal education is scant, as already noted by (Eshach, 2007): Research has not shown interest towards whether the student finds their experiences in non-formal education important. This is quite concerning, as without the students' insight, it is impossible to know what kind of non-formal educational programs support the learning in their opinion. Also, if the students do not find the learning to be important, they will not achieve the learning objectives of non-formal education. Biggs (2003) has argued that conceptual change takes place when students know what the learning objectives are and when they experience a need to achieve them. Therefore, if students do not find non-formal education important, they will not experience an internal need to achieve learning objectives, which leads to ineffective learning.

Furthermore, the experiences of the students are important, as people form a picture of their self-efficacy based on their previous experiments (Lent, Brown, & Hackett, 1994). These beliefs can carry the student a long way, as they affect the formation of interest: It is more likely that the students form interest towards activities which they perceive themselves to be good at and in which they anticipate positive outcomes (Bandura, 1986). Therefore, it is important to know what makes non-formal education important to the youth, as concentrating on these aspects will increase students' interest and affect their career development (see Lent et al., 1994).

Because of the lack of research done on the importance of non-formal education from the students' perspective, the first research question we aim to answer in this paper is:

- What aspects of non-formal education do gifted students find important and why?

Furthermore, in this paper we are also interested in answering the research question:

- What kind of long-term impact does non-formal learning have on the lives of the youth?

The answer to this question will provide us with information on how the youth see the experience after some time; do they still feel that it was as great of an experience as they did during the camp, and have they seen some gained benefits from attending the non-formal education program.

1.2 Millennium Youth Camp as Example of Non-formal learning

In this study, we use data collected from the participants of the International Millennium Youth Camp (MY Camp) (Finland's Science Education Centre, 2012), a case of non-formal education where both the aspects of meaningful learning (see Jonassen, Howland, Moore, & Marra, 2003) and the educational needs of the gifted have been considered (see Tirri, Kuusisto, & Aksela, 2013). International Millennium Youth Camp has been organized by Finland's Science Education Centre LUMA and Technology Academy Finland with two Finnish universities, four Finnish global companies and other institutions since the year 2010.

Before and during the MY Camp, participants worked in groups of six on a group project through inquiry-based learning. In 2010–2102, the projects were related to the themes of Applied mathematics, Climate change, Information & Communication technology (ICT), Renewable energy & resources and Water. Each participant worked on the theme that they showed the most interest towards during the application process.

The group projects were started online two months before the camp. Each group was first given material that they needed to study, so that all the students would have similar base knowledge. The students were then assigned a project, where they got to use their knowledge and creativity to produce a solution to a problem. For example, in 2011 the ICT group thought of ways to increase literacy in developing countries and in 2010 the Water group worked on developing a sustainable water system for a rural village. Throughout the process, experts from a university or a company guided and supported the students.

During the camp, participants continued working on the projects (2–3 hours a day). As most of the planning and research was done before the camp, the main goal during the camp was for the students to reflect on the ideas with each other, as well as compile their project into a poster. They were also given the opportunity to elaborate on their thoughts and ideas with experts.

On top of working on the projects, during the camp the attendees visited universities and companies, where they met with experts from various fields, as well as learned about studying and working opportunities. They were also given a lecture by one of the winners of the Millennium Technology Prize, a prominent prize given by Technology Academy

Finland, after which they had a questions and answers session. In the evenings, the camp program included activities where the students could interact with each other over activities such as games and sports. They also had an international evening, where each attendee presented something from their own country/culture. The camp culminated in the Millennium Youth Camp Gala, where campers presented their project works in a symposium-type of event and were given awards by the organizing institutions. Experts from universities and companies attended the event, as well as diplomats from some of the countries of the youths' origin.

2 Method

This study consists of two parts. The first part of this study is a qualitative survey study, in which the data was collected from all the campers (n=88) who part took in the Millennium Youth Camps in 2010–2012. All three camps were similar in content, instruction and schedules, with only minor differences, making it possible to combine the data from all of the camps. The second part of this study is a documentation study, to which data was collected from 30 of the campers.

The campers were selected to the camp through a rigorous two-stage application process. During the process, giftedness and motivation were tested through a number of ways. In the first stage, students were asked to write about their earlier achievements as well as their motivation to apply to the camp. To measure giftedness, achievement in school, competitions and self-projects were valued. Motivation was measured both by earlier activity in the given field, as well as the students own description on why they are interested in the topic. The best applicants (100 students) were selected to the second round, where they needed to do a project work on a theme given to them by the experts. Each theme group had different projects so that students were able to do the projects on the themes that interested them the most. The projects were evaluated according to the depth of student's knowledge, scientific research skills and scientific writing skills. The top applicants from the second stage were interviewed to ensure that they had understood their own project work and to ensure that they had sufficient language skills (the working language of the camp was English). Annually, 28 to 30 campers were selected from over a thousand applicants to attend the camp. All of the participants were 15–19 years old at the time of the camp.

To answer the first research question; *what aspects of non-formal education do gifted students find important (part 1)*, data was collected from all the campers (n=88) by an open ended questionnaire at the end of each camp. The 88 campers came from all the habited continents of the world as follows: Africa (n=4), Asia (n=24), Europe (n=44), North America (n=5), Oceania (n=6) and South America (n=5). Out of the campers, 43 were male and 45 were female and all the campers were 15–19-year-olds at the time of the camp.

In the questionnaire, the students were asked to reflect on their camp experience by writing down three highlights of the camp, three areas of improvement and by giving additional feedback on their camp experience. This method of collecting data was selected as it gives students the possibility to describe their experiences in their own words, as well as makes it possible to collect data efficiently (L. Cohen, Manion, & Morrison, 2008).

The answers of the students were then analyzed by content analysis by two researchers. Based on their analysis, the researches came up with groups, which were reevaluated to see if some groups could be combined. A description of each group was then made and using these descriptions the data was reassessed into these new groups. To ensure the reliability of the categorization, the categorizations of the two researchers were compared by randomly selecting 88 answers. The inter-rater reliability was measured by Cohen Kappa – analysis, a method that examines the agreement between two raters. The equation for the analysis is:

$$\kappa = \frac{Pr(a) - Pr(e)}{1 - Pr(e)}$$

where Pr(a) is the relative observed agreement between the researchers and Pr(e) is the hypothetical probability that agreement happens by chance (J. Cohen, 1960). The agreement between the two researchers was found to be 0,935, showing that the reliability of the categorization was excellent.

To find out the impact of the non-formal education experience (part 2), the campers of year 2010 and 2011 were contacted a year after the camp and asked to write an essay with the title *How Millennium Youth Camp affected my life*. Thirty of the sixty students were reached, 18 of whom were male and 12 were female. The answers represented all the continents of the campers.

The written essays were analyzed by content analysis to find an answer to our second research question; *What kind of long-term impact does non-formal learning have on the lives of the youth?* Based on the content, researchers found eleven categories present in the essays. The categories were defined, after which each essay was analyzed again to see which of these eleven categories each individual essay contained. The analysis of the essay was then returned to the author of the essay (the camper) and they were asked to mention which of the categories they agree with and to tell if there were some categories in the list of eleven that they found to be present in their essay, but were not mentioned by the researcher. Using this method, the agreement between the researcher and the campers was also excellent (0,914) (calculated with the formula above).

3 Results

3.1 Important aspects of non-formal education

3.1.1 Social interactions

As social interaction is an important part of non-formal education (Gilbert & Priest, 1997); Tolppanen, Aksela & Tirri, unpublished), the camp program was planned so that the students had time to get to know each other and interact in both formal and informal setting. Through content analysis, it was found that the amount of social interaction was abundant during the camp (see table 1).

Table 1: Frequencies of the most mentioned social interactions

Category	Frequency (n)
International evening	46
Youth with common interests	29
Contact with experts	24
Sauna	13
Touring Helsinki	8
Welcome & farewell-party	5
Total	125

The most important form of social interaction was found to be the international evening (n=46), where attendees presented something from their own country. Presentations included anything from dances, songs, and karate performances to stories. This part of the program was seen as important, as the youth got to understand each other's similarities and differences better, realizing that even people coming from very different backgrounds are similar in many ways. A male student from Africa wrote:

The international evening brought together different cultures and it really helped us get along with each other

And a female from Oceania talked about the international experience in the following words:

We learned about many cultures and how to interact and get over differences and become friends just as the world should be.

The international evening was seen by many of the students as an important event, where they felt they could relate to other students on a deeper level: They realized that they all came from different backgrounds and cultures.

The campers also found it important that they made friends with the youth from all around the world with common interests (33%, n=29). A female attendee from Europe expressed this in the following way:

It was great to see people from all around the world that share similar interests and are having fun

As the youth were surrounded by other youth with similar passions as their own, they inspired each other in both social and academic ways. One of the male students from Africa wrote:

I really learned a lot... I learned that I shouldn't forget my goals and I need to work hard to reach them. The camp has given me a challenge that has inspired me to do something more serious than what I was planning on before.

During the camp, the teams were guided on their project works by either a researcher from the university or an expert from a company. The campers also took part in the Millennium Technology Prize Gala, where they witnessed renowned scientists being awarded for their work. On top of this, they had a private discussion session with the winner(s) of the Millennium Technology Prize (MTP), where they were able to ask questions as well as get autographs. Many of the youth described these contacts with experts as very inspiring (27%, n=24). A girl from Africa wrote it like this:

One of the biggest highlights of the camp was meeting the experts and learning firsthand how and what they do. I find it important that I will be able to stay in contact with them and I learned so much from them.

And a male student from North America wrote about meeting the MTP winners:

It was a moment that really motivated me to continue pushing forward and look for my dreams.

Some students also stated that activities such as sauna & swimming (15%, n=13) and touring Helsinki (9%, n=8) were important. These events are closely related to the Finnish culture, and popular for that reason. However, the mentioning of these, as well as the welcome & farewell party (6%, n=5), was much more uncommon than mentioning the categories discussed above.

3.1.1 Academic activity

The results show that the campers also found academic activities such as visiting universities and companies, working on the project and attending the Millennium Prize Gala important (see table 2).

During their week in Finland, the campers visited two Finnish universities as well as Finnish global companies. During these visits, they got to meet experts from different scientific fields, learned about the research done at the universities, and got professional

Table 2: The frequency of academic activities mentioned

Category	Frequency (n)
Visiting universities	26
Visiting companies	18
Project work	17
Millennium Prize Gala	14
Millennium Youth Camp Gala	13
Amazing Race of Science	4
Visiting science center	3
Total	95

help for their own projects. Visiting the universities (30%, n=26) and companies (20%, n=18) were the two most mentioned academic highlights of the camper's non-formal education experience. A male student from Asia wrote:

Visiting the universities was fascinating because it showed me how high the level of education in Finland is.

The third most mentioned academic activity, was working on the project (19%, n=17). During the camp, the youth worked in groups of six on a project related to their field of interest. The youth started working on the projects two months before the camp through the internet and the work was brought to completion during the camp. When assigning the project work, the aspects of meaningful learning were implemented (see Jonassen, et al., 2003), as the youths' questions were the basis for the theme of the project work and the youth were in control of towards which direction they wanted to take their research. The students were given a few guidelines from the experts, as well as some links for reference, but the students decided in what depth they wanted to look at different issues regarding their project work. Working on the project was seen as challenging but rewarding and one of the female attendees from Europe wrote about the project work in the following words:

Working on the project with the group and experts was great because it was interesting to do something I wouldn't have been able to do alone.

And a female student from Asia wrote:

One of the highlights was the time we spent working on the group project, cooperating with many experts. During this process I learned to work in an international group and I obtained much knowledge.

In the years 2010 and 2012, the campers had the chance to attend the Millennium Technology Prize gala, where renowned scientists are rewarded for their achievements. The students found it very inspiring to take part in this gala, as fourteen (16%, n=14) of them mentioned this as one of the greatest highlights of the camp. The 2011 campers did not have

the opportunity to attend the gala, therefore, the response rate would have been higher, if they too had attended.

At the end of the camp, the attendees had a symposium-type of gala, where each group presented their work. At the gala, there were visitors from universities and companies as well as diplomats from the countries of the attendees. The idea of the gala was to show the youth that their work was appreciated. Thirteen (15%, n=13) of the students mentioned that the gala was a significant part of their non-formal education experience. One of the male attendees from Asia wrote about the gala like this:

It was my first time to give a formal presentation in a significant situation

And a male student from Africa described the event with the following words:

The MY camp Gala was such a prestigious event as it gave the opportunity to present our project before experts

Other activities, such as the Amazing Race of Science (5%, n=4) and visiting a Science Center (3%, n=3), did not seem to make a great impact on the students, as only a few mentioned them as the highlights of the camp.

3.2 Impact of non-formal education (part 2)

A year after the non-formal education experience, the participants from 2010 and 2011 were asked to write an essay on how the camp experience had impacted their lives. Half (50%, n=30) of the participants were reached and their essays were analyzed through content analysis. Three main groups arose from the data, namely, *impact on self*, *social impact* and *academic impact*. Though these groups partially overlap, they have distinct characteristics that are explained below (for frequencies, see table 3).

3.2.1 Impact on self

The content analysis of the essays revealed that the camp had an impact on how the youth saw themselves and how they saw and reacted to things around them. In total, 87% (n=26) of the attendees mentioned that the camp had an *impact on self*, meaning that the experience had either motivated them in their lives, changed their view of life, gave self-confidence or gave a greater will to strive in life. Over half (53%, n=16) of the students wrote that the camp *motivated* or inspired them to do something they otherwise may not have done, or had given them something that has pushed them forward. A girl from Europe wrote:

Millennium Youth Camp gave me the motivation to apply to Cambridge and focus on my studies

Table 3: The impacts of non-formal education

Main category	Sub-category	Frequency (n)
Impact on self	Motivation	16
	View of life	14
	Self-confidence	10
	Striving in life	8
Social impact	International domain	16
	Friendships	14
	Group dynamic	11
Academic Impact	Vision for future	16
	View on education	17
	School/internship acceptance	5

And an Australian girl writes:

Being able to be in the presence of such great researches and innovators was such a great motivator! ...it definitely made me more passionate about what I do.

Attendees also said that the experience had been an eye-opener for them, as they had realized or experienced something that changed their *view of life* (47%, n=14). A male attendee from Europe wrote:

I think the main effect of MYC to me was how it really opened up my mind to all the world of possibilities, talents, and opportunities. Seeing all the incredibly bright young people of the same age and all the creative innovations surrounding our everyday life helped me look beyond the invisible borders of Finland.

Also, up to 33% (n=10) of the campers mentioned that they had gained *self-confidence* because of their experience and 27% (n=8) said that they want to *strive and aim higher in life* because of their experience.

3.2.2 Social impact

Even a year after the camp, attendees felt that the camp had a great social impact on them. Again, the results show that the campers saw the international side of the camp (53%, n=16) as important, saying that they now have many friends around the world that they keep in touch with and have a broader view of different cultures and people. One of the male students from Europe wrote:

Internationality was a very valuable theme on the camp. It gave me new perspective to the things we talked about and I felt like making friends all over the world.

And a male student from South America wrote:

The main idea I learnt in MY camp is that the world isn't as big as I imagine, and I have the possibilities of travel and even study for my PhD abroad.

And he continues

MYC was a wonderful time, getting to meet so many people from so many different places, united by an interest in science,

agreeing with the many (47% n=14) others who mentioned the new friendships as important.

Some mentioned that it was really important to be among like-minded people (27%, n=8) and a few even mentioned that it was the first time in their lives that they experienced this. A male camper from Europe wrote:

It was the first time when other people have appreciated me for what I have passion for. It was a place where I truly felt I belong.

Furthermore, the attendees felt that through the camp they learned to work in groups and felt that the *group dynamics* (37%, n=11) was very important in making the experience so positive and that it has had an impact on how they see working in a group. One of the female campers from Europe wrote:

I usually hate working in teams... [but at the camp] we were an actual team as we were equal in skills and knowledge and I, for the first time in my life, enjoyed team work.

3.2.3 Academic impact

The results show that many of the attendees felt that the camp had a great academic impact on them. First off, 60% (n=18) of the attendees mentioned that the camp gave them a clearer vision for their future in the sense that they knew more particularly what they wanted to study, or how they wanted to combine different fields of expertise in their studies. A male student from Asia described his thoughts in the following words:

Most of the activities I have done on the group project are great influences for choosing my career right now. I, actually, have been interested in Applied Math since I was at high school, and the camp has much enlightened me about what I am going to pursue in the future.

Also, 57% (n=17) of the students said that the experience positively impacted **their view on education**. For some, this impact was more about learning a new skill, whereas for others it was a change in mind-set. A female camper from Europe wrote:

I began thinking differently about science and got more interested in sustainability issues.

And a female camper from Oceania said:

MY Camp has really shown me the breath of academy, and also the globalization of the world's academics that I really hadn't paid too much attention to, being in high school.

Also, in a few of the statements it was clear that the attendees felt that they learned more about the nature of science, and because of that became more interested in it.

Five (17%) of the students also mentioned that the experience has had an impact on them getting accepted to a school or a workplace. A female camper from Oceania said the following:

While I was applying for various Universities MY Camp always left an extremely good impression. I have also been granted a scholarship from an Austrian foundation mainly because I attended MY Camp as the only Australian.

4 Discussion

In this section, we talk about the implications that this research has on non-formal education for the gifted. Previous research has already shown the many benefits of non-formal learning (Pedretti, 2002; Rhodes, 2013), but in this research we get a clearer picture of what makes a non-formal educational program successful. First, we will discuss what types of social interaction are important for the youth, after which we will look at academic support that non-formal education can provide. We will also discuss the long-term implications of non-formal learning, as well as talk about the limitations of this study. At the end of this section, we will discuss what further research should be done in order to advance non-formal education.

4.1 Social interactions

Based on our findings, the most important aspect of non-formal education is to give the participants new kinds of experiences and opportunities in both the social and academic context. From our research, we see that within the context of social interactions among participants, this means getting the students out of their comfort zone and asking them to show a glimpse of their lives. As non-formal education is generally voluntary, attendees usually already have areas of common interest at the start of the program. However, students may come from very different backgrounds and may have great differences in culture, attitudes and interests. Being able to look past these differences is important as the relations of different kinds of people can only blossom when group identity is formed (Rutland et al., 2012). At the Millennium Youth Camp, the international evening was found to make it easier for the students to look past these differences and find their similarities.

On top of the social interactions among students, the social interactions with experts are also an important part of non-formal education. The importance of these interactions was already noted by Tannerbaum (1986) but our findings give some implications on why these are important: Based on our results, the experts motivated the youth and made them want to aim high in life. Our research implies that one explanation for this is that the experts were highly specialized in a field that the students were interested in: The students were able to discuss their ideas with someone, who had dedicated their life to that particular field. Another possible factor is that the campers got to see and hear a little bit about their experts' lives: Due to the intense week, some experts brought their children to the camp and some talked about what kind of projects they are working on at their work-place. These aspects brought the experts closer to the lives of the youth. Therefore, it seems that it is not only important that the coaches help the students advance academically, but that they expose something from their own life; whether it is home or work related. Through these interactions with experts, students get a more holistic view of what it would be like to work in the field of science, possibly further increasing their interest in the academic side.

However, similar interactions between students and teachers/experts may not be possible in all forms of non-formal education. For instance, in a study by Schwier and Seaton (2013), it was evident that social interactions in a non-formal online program were not as common and rich as in a formal program. And though this does not imply that integrating important social interactions into online learning is impossible, it does show that a challenge exists. It is also important to note that the same principles of social interaction may not apply to groups that have very different fields of interest to start with. Though this is quite uncommon in non-formal education, we presume that it can occur especially among younger students, as they might take part in a non-formal educational program due to parents' interests. In cases like these, we suggest that an extra amount of time should be used to bring students and experts together, as social relations are an important part of the non-formal educational experience.

4.2 Academic support

Looking at the academic context, the findings of this research imply that non-formal education should not only aim to reach the interests and skill-level of the students, but allow them to work on a project that they find meaningful; something that they are not only doing for themselves, but also for others. Meaningful learning has been defined as being active, intentional, constructive, collaborative and authentic (Jonassen, et al., 2003). Reflecting this definition on our findings, we find all of these aspects to be mentioned by the youth. However, according to our study, intentionality is the most important of these, as the youth especially appreciated the fact that they could work on a project that potentially had an impact on society.

In addition to working on great projects, we found that students were particularly motivated from visiting universities and companies, as well as seeing renowned scientists' awarder for their work. In previous research, especially the impact of non-formal learning in science centers has been studied (Pedretti, 2002), but surprisingly, in our research, visiting universities and companies was much more appreciated than the visit to a science center. Though this result can be caused by the unique group of students that the Millennium Youth Camp consists of, it is worth noting that a gifted group may find other activities more appealing than a science center. We found that one reason for this is that during the visits the campers got to meet and talk with experts from different fields, as well as see what is happening in the field of science at the moment. Another reason is that many of them were thinking about a career in science, so they were interested to see what their future jobs would be like. Therefore, it seems that the reason why the universities and companies were preferred over the science center, was the authenticity that they offered the students.

Based on our research, we can sum up that in non-formal education the following things should be taken into consideration:

- Give participants new experiences and opportunities
- Plan the program so that social interactions are taken into account
- Create an atmosphere that encourages discussion
- Give participants the opportunity to tell something personal about themselves
- Give participants the opportunity to hear and learn about each other and experts, on a personal level
- Plan the projects so that they are meaningful (projects should not be only for the student, but for the community)
- Plan projects so that they stem from the students questions and interests
- Include visits to universities and organizations, where participants get to meet and talk with the staff

4.3 Long-term impact

The findings of this study also indicate that by providing meaningful social interactions and academic support, positive effects persist over time. These include an increase in motivation and self-confidence, which have also been noted in previous research (Thomas, 1989). However, in our research, we found that not only did the students mention that they were more motivated and self-confident, but many of them mentioned that their view of life had changed during the camp. They had started to see a world of possibilities and opportunities around them, leading them to places where they would not have imagined finding themselves before: For some this meant applying to an ivory league university, and

for others it was the vision to start studying a specific field. Many of the students also mentioned that due to the camp they had a clearer vision of their future and wanted to aim high in life. Therefore, our findings imply that due to the increase in motivation and self-confidence, the students looked for, and found ways in which they can build on their knowledge further. They found what they can do with their skills and decided to pursue those fields. This finding gives further evidence to previous research, where it has been shown that people form a picture of their self-efficacy based on previous experiments (Lent et al., 1994).

4.4 Further implications

An organizer of non-formal education has the possibility to facilitate interactions between students and experts. As interactions take place outside of the program, we suggest that they are easily overlooked as an important part of the planned program. However, our findings suggest that organizers should facilitate certain types of interactions, as they can help bind the students and experts together. Furthermore, seeing the importance of facilitating social interaction in non-formal education, we suggest that attention to interactions is something that should be implemented into formal education as well. As an example, at the start of the course, some time could be used to help the students learn more about each other and where they are coming from. Also, especially during voluntary courses held in schools, teachers should seek for opportunities to co-operate with universities and companies. Ideally, during these courses an expert from outside of the school could help the students with the project work, in a similar fashion that was done in the Millennium Youth Camp. Also, some of the work by the students should be done in universities and companies, giving the students an idea of different kinds of work environments, possibly helping them discover what they are interested in.

4.5 Limitations

Some of the benefits of this study are that it provides a unique example of real people in a real life situation and that it gives an insight into causes and effects, that may hard to study in a larger and more diverse group.

However, the generalization of a study must always be evaluated. In this research a “chain of evidence” (Yin, 2009, 41) of the validity of the results is produced by using the Cohen’s Kappa. Furthermore, reliability is increase by providing both numeric and qualitative data, decreasing the possibility for picking and choosing data (L. Cohen et al., 2008, 293-295). However, as in all qualitative studies, it is possible that the researchers’ initial prejudices or suspicions have an effect on how they see the data (Yin, 2009, 72). In our research this was most possible when categorizing the essays written by the students. Though the researchers asked the authors to check the categorizations that had been made

from their essays, it is possible that the ready-made categories affected the students' judgment. Furthermore, though they were asked to mention categories that they thought were present, but not mentioned by the researchers, this opportunity was not seized by the students.

In addition, the findings were made with a unique sample of highly gifted youth, whose needs and experiences can be different from those of average students. As noted earlier, one of the students mentioned that he had never before felt that he was a part of a community, and another said that she had never enjoyed group-work before. Though these kinds of experiences can occur in any group of people, it is possible that they are more common among gifted youth (see Adams-Byers et al., 2004). Also, since the application process to the Millennium Youth Camp was so complex, already the fact that a student was accepted to the camp had a positive effect on their motivation and self-confidence; something that is not the case in all non-formal educational programs. Because of these reasons, the results are not directly applicable to all non-formal educational programs and further studies on similar programs aimed for average students are needed.

Furthermore, when considering the long-term effects of non-formal learning, it is important to note that in this study, the attrition rate was 50%, which can cause bias in the results. Though all of the students were reminded two times to answer the questionnaire, half of the campers left it unanswered. One reason for this is the busy student-lives that the youth live; reflecting on experiences and writing an essay takes some time. It is also possible that some of the campers were not reached, as email addresses can change. However, this group should not make up more than 5–10% of the loss. Therefore, it is also possible that some students felt that the camp did not have a great impact on their lives or felt uncomfortable answering the survey, as it was not possible to answer it anonymously. However, based on the anonymous feedback collected directly after the camps, almost all of the campers felt that the camp was a significant event in their lives. Therefore, we believe that the big attrition rate was mainly caused by busy schedules, and could only be avoided by using a different research method, such as phone interviews. However, other methods would not have given the campers the same freedom to reflect on their experiences, and so, the answers may not have been as in-depth or precise.

4.6 Further research

Due to the findings in this paper, new questions to improve non-formal education were brought up. Further research should be done on the differences of social interactions between formal and non-formal learning. This could give implications on the specific social needs that non-formal education addresses and formal education perhaps does not. Furthermore, as online-learning is growing fast, it would be important to find out how social interactions can be implemented into online learning in a way that they support the learners' social needs.

The findings of this paper also showed that students enjoy working on a project that they find meaningful. Surely, even during the Millennium Youth Camp, students would have graded the meaningfulness of their projects differently: Some would have said that it had a big impact on society, and others would not have seen much of an impact at all. Therefore, it would be interesting to find out, what kind of projects give students the impression that their project is meaningful and how large does the impact have to be; when is it enough that the project has an impact on their own learning and when should a project have an impact on the community, in the field of science or on the world.

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