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# Sustaining the miwelt Project

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# **Sustaining the miwelt Project**

Interactive Qualifying Project Report completed

In partial fulfillment of the requirements for the Degree of Bachelor of Science

*At Worcester Polytechnic Institute, Worcester, MA*

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# Abstract

The purpose of our IQP is to provide recommendations for sustaining the miwelt project. In order to accomplish this goal, we identified three primary objectives. The first objective was to review the current financial state of the miwelt project. This involved two major aspects: aggregating the current financial data and performing a financial analysis of the miwelt project's activities at the Hochschulspektakel. The second objective was to investigate non-corporate methods of funding. Our primary areas of focus for this objective were crowdfunding and the feasibility of using an electronic book (e-book) to generate revenue. Our third and final objective was to evaluate how corporate sponsorship would affect the perception of the Swiss public towards the miwelt project.

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# Table of Contents

Abstract.....	1
Acknowledgements.....	2
Table of Figures.....	5
Executive Summary.....	8
1.0 Introduction.....	10
2.0 Methodology.....	12
2.1 Introduction.....	12
2.2 Financial Analysis.....	12
2.3 Non-Corporate Funding Methods.....	13
2.4 Corporate Sponsorship.....	14
3.0 Literature Review.....	15
3.1 Background to Microbial Biotechnology in Switzerland.....	15
3.2 Current Market State.....	15
3.3 Traditional Funding Methods.....	17
3.4 Electronic Educational Literature.....	19
3.5 Crowdfunding.....	21
4.0 Data and Analysis.....	24
4.1 Hochschulspektakel.....	24
4.2 Aggregation of Financial Data.....	38
4.3 Survey on ZHAW: Campus Grüental.....	40
4.4 E-book.....	44
4.5 Crowdfunding.....	47
5.0 Conclusions and Recommendations.....	54
5.1 Hochschulspektakel.....	54
5.2 Cutting Costs.....	57
5.3 Foundations.....	59
5.4 Corporate Sponsorship.....	59
5.5 E-book.....	60
5.6 Crowdfunding.....	61
5.6a Hochschulspektakel.....	61
5.6b Comic Book.....	64
5.6c Other Activities.....	66

5.7 Final Conclusions .....	66
References .....	68
Appendix.....	74

# Table of Figures

Figure 1 - Visualization of Distribution of Experiences at the Hochschulspektakel.....	26
Figure 2 - Visualization of Top Three Engaged Demographics at the Hochschulspektakel .....	27
Figure 3 - Visualization of Categorical Breakdown of Total Festival Cost .....	29
Figure 4 - Visualization of Distribution of Children’s Average Experience by Gift.....	31
Figure 5 - Visualization of Distribution of Children’s Average Interest Level by Gift .....	32
Figure 6 - Visualization of Distribution of Children’s Average Dialogue Level by Gift.....	33
Figure 7 - Visualization of Distribution of Average Experience by Number of Gifts .....	35
Figure 8 - Visualization of Distribution of Cost--Effectiveness Ratios for Gifts .....	37
Figure 9 - Responses to Question 1b of the ZHAW Life Science Department Survey .....	42
Figure 10 - Responses to Question 3 of the ZHAW Life Science Department Survey .....	44

## **Hochschulspektakel Analysis**

Figure 11 - Gifts Distributed at the Hochschulspektakel .....	74
Figure 12 - Visualization of Gifts Distributed at the Hochschulspektakel .....	74
Figure 13 - Distribution of Experiences of Engaged Parties at the Hochschulspektakel .....	75
Figure 14 - Distribution of Demographics Engaged at the Hochschulspektakel .....	75
Figure 15 - Distribution of Facial Expressions of Engaged Parties at the Hochschulspektakel ..	75
Figure 16 - Visualization of Distribution of Facial Expressions at the Hochschulspektakel .....	76
Figure 17 - Distribution of Dialogue Levels of Engaged Parties at the Hochschulspektakel.....	76
Figure 18 - Visualization of Distribution of Dialogue Levels at the Hochschulspektakel .....	77
Figure 19 - Distribution of Interest Levels of Engaged Parties at the Hochschulspektakel.....	77
Figure 20 - Visualization of Distribution of Interest Levels at the Hochschulspektakel .....	78
Figure 21 - Visualization of Overall Experience of Engaged Parties Over Time at the Hochschulspektakel .....	78
Figure 22 - Visualization of Children’s Overall Experience Over Time at the Hochschulspektakel .....	79
Figure 23 - Visualization of Adult’s Experience Over Time at the Hochschulspektakel .....	79
Figure 24 - Distribution of Experiences Given Microbial Booklet Gift .....	80
Figure 25 - Visualization of Distribution of Experiences Given Microbial Booklet Gift .....	80
Figure 26 - Distribution of Experiences Given Falcon Tube Gift .....	81
Figure 27 - Visualization of Distribution of Experiences Given Falcon Tube Gift.....	81
Figure 28 - Distribution of Experiences Given Agar Plate Gift .....	82
Figure 29 - Visualization of Distribution of Experiences Given Agar Plate Gift.....	82
Figure 30 - Distribution of Experiences Given Lab Glove Gift.....	83
Figure 31 - Visualization of Distribution of Experiences Given Lab Glove Gift .....	83
Figure 32 - Distribution of Experiences Given Vial Box Gift.....	84
Figure 33 - Visualization of Distribution of Experiences Given Vial Box Gift .....	84
Figure 34 - Distribution of Experiences Given Comic Book Gift.....	85
Figure 35 - Visualization of Distribution of Experiences Given Comic Book Gift .....	85
Figure 36 - Distribution of Experiences Given Yeast Balloon Experiment Gift .....	86
Figure 37 - Visualization of Distribution of Experiences Given Yeast Balloon Experiment Gift...86	
Figure 38 - Distribution of Experiences Given One Gift .....	87

Figure 39 - Visualization of Distribution of Experiences Given One Gift .....	87
Figure 40 - Distribution of Experiences Given Two Gifts .....	88
Figure 41 - Visualization of Distribution of Experiences Given Two Gifts.....	88
Figure 42 - Distribution of Experiences Given Three Gifts .....	89
Figure 43 - Visualization of Distribution of Experiences Given Three Gifts .....	89
Figure 44 - Distribution of Average Experience by Demographic .....	90
Figure 45 - Visualization of Distribution of Average Experience by Demographic.....	90
Figure 46 - Distribution of Average Experience by Number of Gifts.....	90
Figure 47 - Distribution of Children's Average Experience by Gift .....	91
Figure 48 - Distribution of Children's Average Interest Level by Gift.....	91
Figure 49 - Distribution of Children's Average Dialogue Level by Gift.....	92
Figure 50 - Itemized Cost Breakdown of Vial Box Gift.....	92
Figure 51 - Itemized Cost Breakdown of Falcon Tube Gift .....	92
Figure 52 - Itemized Cost Breakdown of Microbial Booklet Gift .....	93
Figure 53 - Itemized Cost Breakdown of Lab Glove Gift.....	93
Figure 54 - Itemized Cost Breakdown of Agar Plate Gift .....	94
Figure 55 - Itemized Cost Breakdown of Yeast Balloon Experiment Gift .....	94
Figure 56 - Itemized Cost Breakdown of Comic Book Gift.....	95
Figure 57 - Distribution of Cost-Effectiveness Ratios for Gifts .....	95
Figure 58 - Itemized Breakdown of Total Festival Cost .....	96
Figure 59 - Categorical Breakdown of Total Festival Cost.....	96
Figure 60 - Raw Data Collected from the Hochschulspektakel .....	97
Figure 61 - Total Revenue Information.....	98
Figure 62 - Total Cost Information.....	98
Figure 63 - Remainder Not Covered by Total Grant Revenue .....	98
Figure 64 - Itemization of SNSF AGORA Grant (overview) .....	98
Figure 65 - Itemization of SNSF AGORA Grant (detailed).....	99

### **Financial Aggregation**

Figure 66 - Budget Per Year from SNSF (overview).....	100
Figure 67 - Breakdown of Salaries .....	100
Figure 68 - Cost of miwelt Events.....	100
Figure 69 - Itemized Costs of Ferienpass.....	101
Figure 70 - Itemization of Concept Revision for Ferienpass .....	101
Figure 71 - Itemization of Organization and Realization for Ferienpass.....	102
Figure 72 - Itemized Costs of SCNAT Jubilee .....	103
Figure 73 - Itemization of Concept Development for SCNAT Jubilee .....	103
Figure 74 - Itemization of Organization and Realization for SCNAT Jubilee .....	104
Figure 75 - Invoice for miwelt Comic Book .....	105
Figure 76 - Invoice for Yeast Balloon Experiment Booklet.....	106

### **Corporate Sponsorship Survey**

Figure 77 - Survey Distributed to ZHAW Life Science Department.....	108
Figure 78 - Responses to Question 1 of the ZHAW Life Science Department Survey .....	109



Figure 79 – Visualization of Responses to Question 1a of the ZHAW Life Science Department Survey .....	109
Figure 80 - Visualization of Responses to Question 1c of the ZHAW Life Science Department Survey .....	110
Figure 81 - Total Responses to Question 1c Extension of the ZHAW Life Science Department Survey .....	111
Figure 82 - Truncated Responses for Question 1c Extension of the ZHAW Life Science Department Survey .....	112
Figure 83 - Responses to Question 2a of the ZHAW Life Science Department Survey .....	113
Figure 84 - Visualization of Responses to Question 2a of the ZHAW Life Science Department Survey .....	113
Figure 85 - Responses to Question 4 of the ZHAW Life Science Department Survey .....	114
Figure 86 - Visualization of Responses to Question 4 of the ZHAW Life Science Department Survey .....	114
Figure 87 - Responses to Question 5 of the ZHAW Life Science Department Survey .....	115
Figure 88 - Visualization of Responses to Question 5 of the ZHAW Life Science Department Survey .....	115
Figure 89 - Responses to Question 6 of the ZHAW Life Science Department Survey .....	116
Figure 90 - Visualization of Responses to Question 6 of the ZHAW Life Science Department Survey .....	116

# Executive Summary

Our sponsor, Dr. Karin Kovar from the Zürcher Hochschule für Angewandte Wissenschaften (ZHAW, Zurich University of Applied Sciences), has developed a program with the intent of improving Swiss opinion of biotechnology: the miwelt project. This project is an educational outreach program that aims to promote a dialogue between primary school students and scientists about microbial biotechnology. It is currently centered in the city of Wädenswil, home of the ZHAW School of Life Sciences and Faculty Management. The purpose of this initiative is to cultivate an appreciation of microbial biotechnology in young children throughout Switzerland. To achieve its goal, the project engages in many different activities in the Wädenswil area.

The Swiss National Science Foundation (SNSF) has provided the miwelt project with two grants in order to carry out its mission. These grants, totaling CHF 206,209, expire in March 2016. As such, the miwelt project needs to secure sources of revenue in order to sustain its current activities.

The purpose of our IQP is to provide recommendations for sustaining the miwelt project. In order to accomplish this goal, we identified three primary objectives. The first objective was to review the current financial state of the miwelt project. This involved two major aspects: aggregating the current financial data and performing a financial analysis of the miwelt project's activities at the Hochschulspektakel, a festival held by ZHAW to promote its programs. The second objective was to investigate non-corporate methods of funding. Our primary areas of focus for this objective were crowdfunding and the feasibility of using an electronic book (e-book) to generate revenue. Our third and final objective was to evaluate how corporate sponsorship would affect the perception of the Swiss public towards the miwelt project. To accomplish this, we surveyed members of ZHAW: Campus Grüental on their opinions regarding corporate sponsorship in educational outreach programs.

From our analysis, we developed a set of recommendations for the miwelt project team. We recommend that they continue attending the Hochschulspektakel as this event was extremely effective in engaging primary school children and it was a relatively cheap event to run. We recommend that they crowdfund the Hochschulspektakel and the other day events the miwelt project participates in. We also recommend that they crowdfund the further development of their educational comic book and utilize some of the funding generated to convert it to an electronic book (e-book). This will allow them to expand their audience to more than just the Wädenswil area. We recommend that the miwelt project partner with Science et Cité and apply to grants from the H.D. Wright Foundation. These organizations share similar goals to the miwelt project and award grant-based funding for educational outreach programs. Finally, we suggest that the miwelt project attempt to secure corporate sponsorship as the Swiss public appears to be accepting of corporately sponsored educational programs. Utilizing the above recommendations, the miwelt project should be able to sustain its current operating activities and increase its audience from the Wädenswil area to all of Switzerland.

# 1.0 Introduction

Microbial biotechnologists are constantly making breakthroughs that address issues faced worldwide. Vaccines are a prime example of how biotechnology improves lives. Without vaccines, numerous crippling diseases would still be prevalent in the world (“Vaccines and Immunizations,” 2014). In 1980, the World Health Organization utilized vaccines to completely eliminate smallpox from the planet (“Disease Eradication,” 2015). Without an understanding of how smallpox operated at a microbial level, biotechnologists would have been unable to develop an eradication method. Fortunately, due to biotechnology, the world is no longer subject to the devastating impacts of this deadly disease.

Despite the benefits of biotechnology, the people of Switzerland still maintain a negative opinion of it. Through their voting, the Swiss have displayed strong disapproval for modern advancements in biotechnology, such as genetically modified organisms and increased research into human reproductive medicine (Dahinden, 2002). The Swiss public have also demonstrated resistance towards biotechnology through polls. Only 20% of the Swiss population had a positive opinion of biotechnology in 1997, with over 50% having a negative opinion (Durant, Bauer, & Gaskell, 1998).

The Zürcher Hochschule für Angewandte Wissenschaften (ZHAW, Zurich University of Applied Sciences) is receiving assistance from the Swiss National Science Foundation (SNSF) to combat this negative mentality. Members of ZHAW developed the miwelt project, an educational outreach program designed to promote a dialogue between primary school students and scientists about microbial biotechnology. This project is headed by our sponsor, Professor Doctor Karin Kovar. The miwelt project participates in many different activities in the Wädenswil area in order to achieve their goal. One such activity is the Hochschulspektakel. This event is hosted annually by ZHAW to show the citizens of Wädenswil its academic programs and activities. During this event, members of the miwelt project walk around with a gift box on a

hawker's tray. People reach into the box and pull out small gifts. The miwelt team then engages in a dialogue with them about how the gift relates to microbial biotechnology. The miwelt project is also creating a children's comic book with a storyline that teaches microbial biotechnology concepts in an engaging and understandable way. Copies of this comic book are often handed out at larger events so children can continue exploring microbial biotechnology concepts at home.

In order to fund these activities, the SNSF has given the miwelt project two grants, worth a total of CHF 206,209, that last from April 2014 to March 2016. As such, the miwelt project's major funding source is due to expire shortly. The purpose of our IQP is to determine how to fund the miwelt project once these government grants expire. In order to accomplish this goal, we identified three primary objectives. The first objective was to review the current financial state of the miwelt project. The second objective was to investigate non-corporate methods of funding. Our third and final objective was to evaluate how corporate sponsorship would affect the perception of the Swiss public towards the miwelt project. By completing these objectives, we developed a set of recommendations for sustaining the miwelt project.

## 2.0 Methodology

### 2.1 Introduction

The miwelt project is an educational outreach program run by Professor Doctor Karin Kovar of the Zürcher Hochschule für Angewandte Wissenschaften (ZHAW University of Applied Sciences). The primary goal of the miwelt project is to engage Swiss primary school students and provide them with an initial and basic introduction into microbial biotechnology through hands-on activities, engagement with ZHAW students, and educational literature. At this moment, the miwelt project is sustained through several grants provided by the Swiss National Science Foundation (SNSF), with some additional funding provided by the university (primarily for administrative costs). Our job is to figure out how to fund the miwelt project once the grants from the SNSF expire and in order to do so, we will explore three overarching research questions:

1. What is the current financial state of the miwelt project and how much funding is required to sustain the project?
2. What are non-corporate methods of funding nonprofit organizations?
3. How would corporate sponsorship affect Swiss public opinion on the miwelt project?

We believe answering these questions will provide us with the information needed to make a strong, evidence-backed recommendation to our sponsor.

### 2.2 Financial Analysis

Compiling and analyzing the financial data of the miwelt project allowed us to understand the current financial state of the project as well as the level of funding our methods will need to supply. Interviewing Chantal Stenger, the financial coordinator of the miwelt project, allowed us to get an overview of the current financial documentation and status of the miwelt project. By gathering data on the Hochschulspektakel, we were able to supplement the existing

financial documentation, allowing us to perform a more comprehensive overview of the project's financial status. Reviewing the data gathered in these two steps gave us an overview on how much money the miwelt project is receiving and spending, as well as where the greatest expenditures of the project are. Once these data were in hand, we identified areas of excessive expenditure, as well as the level of funding needed to sustain the various activities of the miwelt project.

## 2.3 Non-Corporate Funding Methods

Searching Swiss grant distribution websites and databases of ongoing science communication projects for other educational outreach programs allowed us to discover successful funding methods that are likely to be applicable to the miwelt project. With these searches, we were able to cast a wider net to capture not only projects very similar to the miwelt project, but also educational outreach programs not focused in biotechnology. We were also able to focus our research specifically towards projects in Switzerland. By researching these various projects, we were able to identify funding methods that were previously successful in Switzerland and thus have a strong likelihood of continuing to be successful in the foreseeable future. Discovering these funding methods, especially those employed by very similar projects and organizations, allowed us to make strong, evidence-based recommendations to our sponsors on what funding methods to pursue.

Our sponsor displayed an interest in publishing an electronic version of their existing comic book as a means for sustaining the miwelt project. Studying analytics of electronic educational books for children through the Amazon Kindle store and searching grant websites for successfully funded children's educational books allowed us to estimate the cost of developing an electronic educational product for children and how much revenue it could generate. By searching grant websites for projects focused on creating electronic educational products for children, we were able to determine how much past projects have cost to create,

helping us estimate how much it would cost our sponsor. Furthermore, researching the market for electronic educational children's literature allowed us to see if there were any products specifically focused on microbial biotechnology, which helped us determine if this was a venture worth pursuing.

## 2.4 Corporate Sponsorship

Surveying members of the Swiss public on their opinions regarding corporate sponsorship for educational outreach programs allowed us to gauge whether corporate sponsorship would hinder the ability of the miwelt project to achieve its goals. Our survey focused on one major group: the community at ZHAW: Campus Grüental. Surveying members of ZHAW provided us with an insight as to how members of the educational community in Switzerland viewed corporate sponsorship in educational programs. We expected this group to be fairly biased because information received from our sponsor indicated that members of Swiss academia desire that education remain entirely independent from corporate influence. However, we believed this information to still be valuable as it provided a concrete perspective into the public's opinion of corporate sponsorship. Furthermore, as this subset of the Swiss public is likely to show the most apprehension to corporate involvement in educational programs, we felt that if they showed any acceptance to it, it is likely that other members of the Swiss public would be accepting as well.



## 3.0 Literature Review

### 3.1 Background to Microbial Biotechnology in Switzerland

Biotechnology faces resistance from the Swiss population. The past few decades of voting on biotechnology policies reflects this mentality. In 1992, the Swiss public passed the Beobachter Initiative with a majority vote, imposing restrictions on the development of reproductive medicine due to “a growing awareness of a lack of regulation in biotechnology” (Dahinden, 2002). Additionally, in 2005, Switzerland banned the farming of genetically modified crops for five years, and the Swiss parliament recently extended this moratorium until 2017 (“Switzerland,” 2014). Due to these, and other, restrictions on biotechnology, Swiss biotechnologists struggle to acquire the necessary resources to drive further developments in the field (“Switzerland: Three More Years of GM Ban,” 2010).

This resistance to biotechnology has also been repeatedly demonstrated through polls on the Swiss public. In 1997, over 50% of the Swiss population had a negative opinion of biotechnology with only 20% having a positive opinion (Durant et al., 1998). Recently, only one third of the Swiss population was in favor of agricultural biotechnology and 60% expressed desire for restrictions on it (Leybold-Johnson, 2009). The negative opinion of biotechnology is more pronounced in the German speaking part of Switzerland, the location of focus of the miwelt project (Durant et al., 1998). Due to this general dissatisfaction with biotechnology among the Swiss populace, an assessment of the current solutions is necessary to determine if there is a niche that miwelt project fits into.

### 3.2 Current Market State

There are very few microbial biotechnology/bioprocess communications projects in Switzerland. Through our research, we have only discovered four active projects in Switzerland that “compete” with the miwelt project. These projects have similar goals as the miwelt project

and thus should be discussed before determining if the miwelt project has a niche to fit into. The “Getting to Know Microbes” project aims to show the various microorganisms found in the environment. The goal is to get Swiss citizens to “understand the vital role [microorganisms] play in the preservation of biological and ecological systems” (Linder, 2014). Much like the miwelt project, the goal of this project is to promote knowledge about microorganisms. However, the audience of this project is not primary school students, and the project is localized to Val Piora in the Ticino canton. Thus, even though the goals are similar, these projects fulfill different roles in Switzerland.

Another Ticino based project is titled “Successfully Carry out Microbiology in the Classroom,” an educational outreach program run by SUPSI Laboratory of Applied Microbiology. This project is designed to promote education about microbiology in classrooms with experimental work. While this project has very similar goals to the miwelt project, it is focused only on schools in the Ticino canton (Petrini & Tonolla, 2015). As such, their materials and educational efforts fall within the Italian region of Switzerland, so there is still room for a microbial biotechnology outreach project in the German region of Switzerland.

Another project aimed to promote a dialogue between scientists and the public is the “Swiss Life Sciences” project. This project brings researchers from Swiss universities to German and French speaking classrooms in Switzerland to discuss life sciences (“Dialogue Science - Children and Youth,” 2015). As such, the researchers are directly engaged in teaching life sciences to the students. However, this project requires that the school teachers reach out and apply to have a researcher come to their classroom. This approach differs from the approach of the miwelt project, which aims to proactively seek out teachers and classrooms to visit.

The last notable project is titled “BiOutils.” This project aims to solve the issue of requiring expensive equipment to perform modern biology experiments in schools by having researchers bring the materials and knowledge necessary to perform cutting edge experiments to the schools (Petrini & Tonolla, 2015). This project has been active and successfully

accomplishing its goals for over eight years now. However, its target audience is secondary school students, and as such, it is not in direct competition with the miwelt project.

### 3.3 Traditional Funding Methods

Scientific grants from the European Union (EU) are a very lucrative source of funding, but due to tension between Switzerland and the EU, may be difficult to obtain. Horizon 2020 is a new EU framework program for research innovation that works to unite all funding programs of the European Commission relevant to research and innovation. Funding from this program falls into three different categories. One of these categories is labeled “Societal Challenges” (“Societal Challenges,” 2014). The miwelt project’s focus on educational outreach would qualify it under this category. It is thought that Switzerland could participate in the Horizon 2020 program as a third country or as an associated country (“Horizon 2020,” 2015).

Another organization that provides grants to European countries is the European Research Council (ERC). These grants are very popular amongst researchers in Europe due to their high payout, and groups who acquire them can expect to receive between 2.5 and 3.5 million CHF over five years. Historically, the microbiology department at the ETH Zurich has been very successful in acquiring these grants (“Seven ETH Researchers Awarded Grants,” 2015). However, due to the current refugee crisis and Switzerland’s reluctance to provide aid, the European Union has significantly reduced the amount of research funding they provide Switzerland, including funding from the ERC and Horizon 2020 programs (“Horizon 2020,” 2015). As a result, while grants from Europe may be a lucrative source of funding, seeking these grants may not be a viable solution at this time.

Currently, there exist multiple foundations in Switzerland that fund projects aiming to facilitate science education and communication. One foundation in particular, Science et Cité, aims to inform the Swiss public about current scientific topics and generate a dialogue between the science community and society (Rothlisberger, 2012). One specific area of focus is

increasing dialogue between scientists and primary school students. This aligns perfectly with a primary goal of the miwelt project. Science et Cité does not currently fund any program focused on microbial biotechnology and does not fund any program in life sciences that creates a dialogue outside the classroom (“Dialogue Science - Children and Youth,” 2015). As such, the miwelt project falls into a niche not currently covered by Science et Cité and could benefit financially from a partnership.

One additional foundation that funds projects focused on science education and communication is the H.D. Wright Foundation. Currently, this foundation provides revenue to BiOutils, a highly successful biotechnology outreach project, and operates with a dedication “to the advancement of science and science education” (“Fondation H. Dudley Wright,” 2015). This dedication is further complemented with an objective “to develop greater understanding of science in the region of Geneva, Switzerland and internationally, focused on encouraging: interdisciplinary exchange across fields of basic science; young people to explore science and consider it as a career; the general public’s greater appreciation for science” (“Fondation H. Dudley Wright,” 2015). The miwelt project aligns well with the goals of the foundation, and while this foundation is based out of Geneva, it will “consider applications that extend [its] mission elsewhere” (“Fondation H. Dudley Wright,” 2015). Overall, the miwelt project fulfills the foundation’s desires of advancing science education as well as especially encouraging young people to explore science and augmenting the general public’s appreciation for science.

Corporate sponsorship has successfully funded multiple scientific projects in Switzerland and there are entire organizations designed to support it. The KontaktGruppe Für Forschungsfragen (KGF) is an institution that facilitates interactions between companies and individual groups at Swiss research institutions. It acts as a “homogeneous discussion partner” to help strike funding deals between corporations and scientific research projects (“KontaktGruppe Für Forschungsfragen,” 2015). BiOutils receives funding from corporate sponsors and has been active since 2007 (“BiOutils,” 2015). It is large and well received in the

greater Geneva area (where it is based), despite being sponsored by multiple corporations. In fact, the program has been so successful that other projects have used it as a model for both their funding methods and educational approaches. The “Successfully Carrying out Microbiology in the Classroom” project is utilizing BiOutils’ success as a model for its own growth and development (Petrini & Tonolla, 2015). These examples demonstrate that corporate sponsorship is a viable funding method for research and educational projects and is unlikely to tarnish the reputation of an educational outreach program.

Nonprofit projects often rely heavily on donations in order to sustain their activities. Many seek out high-net-worth individuals, whose donations often make up the majority of a project’s revenue (“What are the Major Types of Fundraising Sources”). Securing these individuals - as well as other, less wealthy donors - often requires well-planned, long-term donation campaigns. (“What are the Major Types of Fundraising Sources”). These campaigns require rigorous planning of events and activities designed to solicit donations. Smaller organizations, such as the miwelt project, do not require as vast sums of money to maintain, and as such, need not plan such grandiose fundraising events. However, securing donations is just as important for them. For some projects, it is more important to learn how to solicit donations than it is to optimize spending (Dagher, 2011). The miwelt project is not currently soliciting donations; however, this research suggests that doing so could be a viable method of providing a substantial level of funding.

### 3.4 Electronic Educational Literature

The Swiss National Science Foundation (SNSF) actively supports the development of mobile applications that encourage communication and dialogue between scientists and the public. BrainAnimation is a set of games about the human brain designed for primary school children (Magistretti, 2012). These games were a key aspect of a larger project funded by the SNSF. “Discovering the Hidden Side of Mathematics” received funding from the SNSF to

develop an iPad app meant to teach users how to perform high level mathematics at an elementary level (Parlier, 2013). This application also came with accompanying custom-made e-books that helped teach the concepts to the users. A third example of the SNSF funding the development of mobile applications was their funding of a grasshopper database app. This app was designed to inform the public about the different types of grasshoppers present in Switzerland. It also let them record grasshoppers they found and send them to a central database for cataloging (Riesen, 2015). Our sponsor has expressed interest in creating such an educational application to assist the miwelt project in achieving its objectives. As such, the willingness of the SNSF to fund similar applications could provide us with a potential source of funding for the development and upkeep of such an application.

One of the ways the miwelt project has been capturing the attention of young students is through a comic book with a storyline that teaches microbial biotechnology concepts in an engaging and understandable way. There is currently one completed chapter of this comic book, with many more planned for the future. The comic book is primarily distributed in a physical medium; however, Dr. Kovar has expressed interest in converting the comic to an e-book. As such, we focused our research into electronic literature.

Electronic literature is already a popular medium and its popularity is on the rise. It is fairly defined as a market in the United States and has recently been making significant headway into Europe. In the United Kingdom, recently released statistics from the Publishers Association show that consumer e-book sales were up 366% in 2011 (“Independent Bookshops Falter Against Rise in Ebook Sales,” 2012). Since 2011, the trend has continued. In 2014, there was a significant increase in digital sales, specifically in the segments of children’s books (up 36%), academic textbooks (up 17%), audiobook downloads (up 24%), and educational materials for schools (up 20%) (Winter, 2015). The increase in digitally downloaded children’s books and educational literature bodes well for the miwelt project’s comic, which belongs to both genres. Not only are e-book sales on the rise, the sales of physical books are suffering as a

result. In the United Kingdom, the Booksellers Association provided data showing that the number of independent booksellers declined to 1,094 by the end of 2011, down from 1,159 in 2010 and 1,289 in 2009 (“Independent Bookshops Falter Against Rise in Ebook Sales,” 2012). In addition, figures provided in 2015 show that print revenues in the United Kingdom have fallen 5% to £2.7 billion and e-book sales have risen by 11 percent to £563 million (Biggs, 2015). While e-book sales make up only a fraction of literature sales as a whole, the trend shows that e-books are growing in popularity and printed literature is falling in popularity. Thus, if publishing a book, one should definitely consider delivering it on a digital platform.

Converting a paper book to an electronic book is a fairly simple and relatively cheap process. The main cost involved in creating a book is paying for the actual writing. The cost of converting an existing book to an e-book and marketing it is typically less than five percent of the total production cost (Woghan, 2013). The actual conversion cost from a paper book to an electronic book can be as low as \$299 and potentially as high as \$800 (“Ebook Conversion Costs and Ebook Distribution Prices,” 2015) (Booth, 2015). The miwelt project already has a significant portion of the work done for creating a physical comic book so conversion and publishing will likely be the most sizeable costs and are unlikely to be extraordinarily high.

### 3.5 Crowdfunding

Crowdfunding is an alternative form of financing, and “draws inspiration from concepts like micro-finance and crowdsourcing, but represents its own unique category of fundraising, facilitated by a growing number of internet sites devoted to the topic” (Sannajust, Roux, & Chaibi, 2014). All crowdfunding projects have one thing in common: a large number of people donate a typically small amount of money, allowing the project to be realised (Dietrich & Amrein, 2015). In addition, crowdfunding often utilizes a non-monetary reward-based platform, in which the user will supply the backer with a non-monetary item in response to a donation. While

crowdfunding is mostly focused on generating revenue, it also creates an opportunity for communication and creates a tightly-knit community (Sannajust et al., 2014).

Crowdfunding is a popular means of funding in the United States and it is currently becoming more widely utilized in Europe. Since it was introduced to France in 2007, crowdfunding has worked to raise 40 million Euros invested in 60,000 projects between 2007 and 2012, including 25 million Euros for the single year of 2012 (Sannajust et al., 2014). Crowdfunding has become more prevalent and is on the rise in Switzerland, where CHF 16 million was spent on crowdfunding in 2014, up from CHF 12 million in 2012 (Dietrich & Amrein, 2015). In addition 60% of campaigns launched in 2014 were successfully funded (Dietrich & Amrein, 2015). This bodes well for the miwelt project, as the increased popularity and prevalence of crowdfunding in Switzerland makes it a promising method for securing funding.

Projects are likely to have successful crowdfunding campaigns if they are centered on contributing to society, whether it be through social justice campaigns, community outreach events, or in some other way. There are a multitude of crowdfunding platforms exclusively servicing social projects. One such platform, Razoo.com, has helped generate over \$100 million for 14,000 social good projects (Thorpe, 2012). In Switzerland, 15% of all projects successfully crowdfunded in 2014 were focused on social/community outreach (Dietrich & Amrein, 2015). These projects generated over CHF 1.3 million in total and each campaign averaged CHF 10,217 (Dietrich & Amrein, 2015). The miwelt project is an educational outreach program and as such, is a social project. Based on the evidence cited above, crowdfunding could be a viable funding method for the miwelt project.

Crowdfunding is also an effective method for funding the creation and publishing of books. Since Kickstarter's creation in 2009, over \$80 million has been pledged to publishing, leading to the successful funding of 7,998 publishing projects ("Kickstarter," 2015). The sheer amount of capital that has been generated and the number of projects supported is evidence that people are willing to support independent authors in their quest to write books. The number



of successfully crowdfunded books per year in the United States has more than doubled from 745 in 2011 to 2,064 in 2014 (Bausells, 2015). This is evidence that not only have publishing projects been successful in the past, but they have become more popular and supported as time went on. Many of the publishing projects funded were able to cover the entire cost of the book creation process, including writing, editing, and publishing/distribution. One of the major expenses of the miwelt project is the development and distribution of a children's comic book; therefore, crowdfunding could be used to partially cover its future development.

## 4.0 Data and Analysis

### 4.1 Hochschulspektakel

The Hochschulspektakel is a festival run by ZHAW in Wädenswil as a community outreach program whose primary mission is to make the people of Wädenswil aware of the various specialties and programs that ZHAW offers. This festival occurs right on the shore of Lake Zurich, behind the Wädenswil train station, and as such, attracts a large number of people - including many families with young children. This makes it the perfect place for the miwelt project to spread awareness of itself and engage its primary target group, children between the ages of seven and eleven years old. This year was the third time that the miwelt project has been at the festival, and is the first time that any data has been recorded to analyze the effectiveness of the methods used and perform a financial analysis of the investment needed to attend the festival.

The basic premise of the methods used at the festival is simple. Melanie Ottinger, an assistant to Professor Doctor Karin Kovar, and Valentina Haag, a biotechnology student at ZHAW heavily involved with the miwelt project, moved around the festival grounds carrying a hawker's tray containing a gift box with little trinkets inside. Ian assisted by carrying around a hawker's tray containing supplementary materials, such as two Erlenmeyer flasks containing different microbial solutions and copies of the miwelt comic book. When members of the primary target group (or anybody that appeared interested) were spotted, they were approached and given an explanation about what the miwelt project is, then welcomed to choose a trinket from the gift box. This trinket corresponded to a bigger gift that they would then receive. For example, if a child picked out a balloon from the box, they were awarded the "Yeast Balloon Experiment," which consisted of an instructional booklet detailing how to perform the experiment. Each trinket and gift was thoroughly explained to the gift receiver, with emphasis placed on the connection of the gift to microbial biotechnology and the work done in the bioprocess labs at ZHAW. All of

these interactions were carefully monitored by Khasan and Nick, who recorded several key factors using a sheet developed specifically for this event.

As the main goal of the miwelt project is to promote dialogue on microbial biotechnology and capture primary school students interest on the matter, three appropriate qualitative factors of the gift receivers were recorded: facial expression (denoted as an emoticon smile, neutral face, or frown), dialogue level, and interest level. The time of the interaction, gifts received, and demographic of the gift receiver were also recorded. Once the festival was over, all the records were digitized and then a new spreadsheet was created to allow concrete analysis of the results. In particular, the three primary qualitative factors were quantified and an overall “Experience” scale was created. The factors were quantified as follows:

- Facial Expressions:
  - Frown = -1
  - Neutral = 0
  - Smile = 1
- Dialogue Level:
  - None = 0
  - Minimal = 1
  - Engaged = 2
  - Enthusiastic = 3
- Interest Level:
  - None = 0
  - Low = 1
  - Medium = 2
  - High = 3

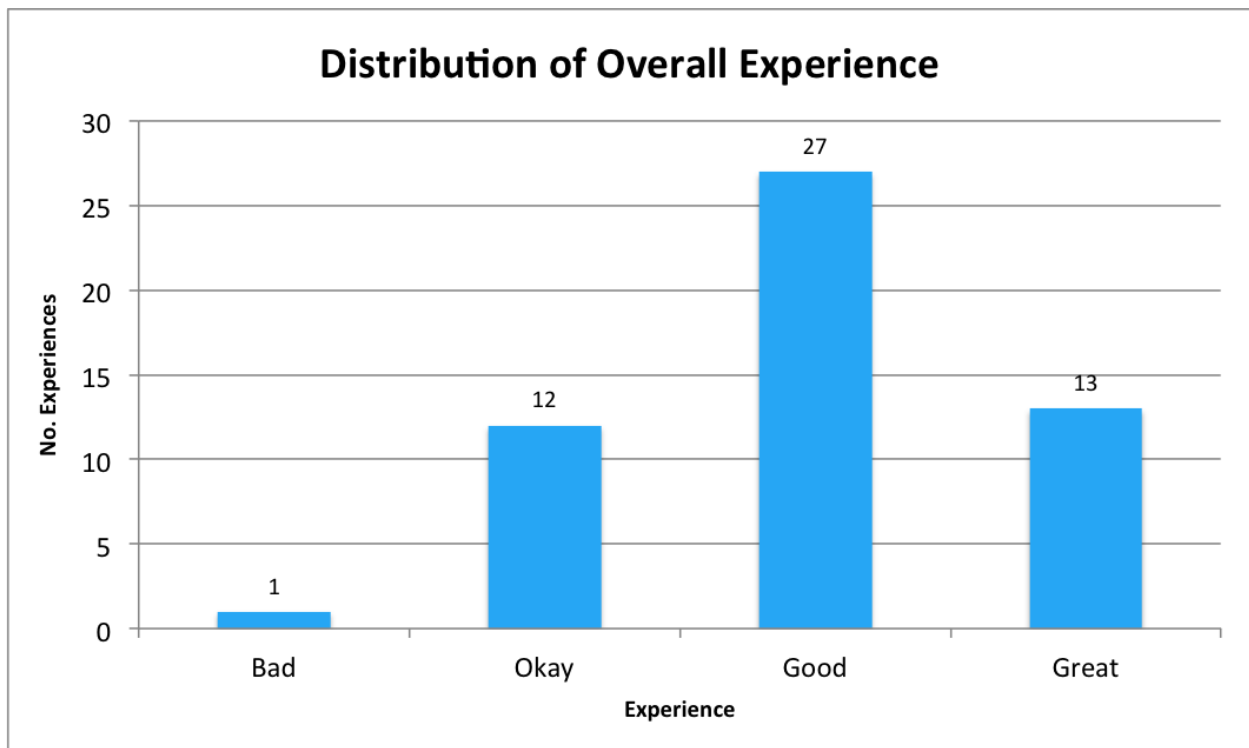
This quantification allowed for analysis of each individual variable, as well as analysis of the overall experience for subjects. This overall experience was measured as the sum of the points

received for facial expression, dialogue level, and interest level. As such, “Experience” could range from -1 to 7, and was defined by the following scale:

- -1 to 1 = Bad
- 2 to 3 = Okay
- 4 to 5 = Good
- 6 to 7 = Great

As this scale is defined in discrete values, when performing the analysis, non-discrete values were rounded appropriately when needed.

Overall, the Hochschulspektakel was a success, as indicated by the distribution below:

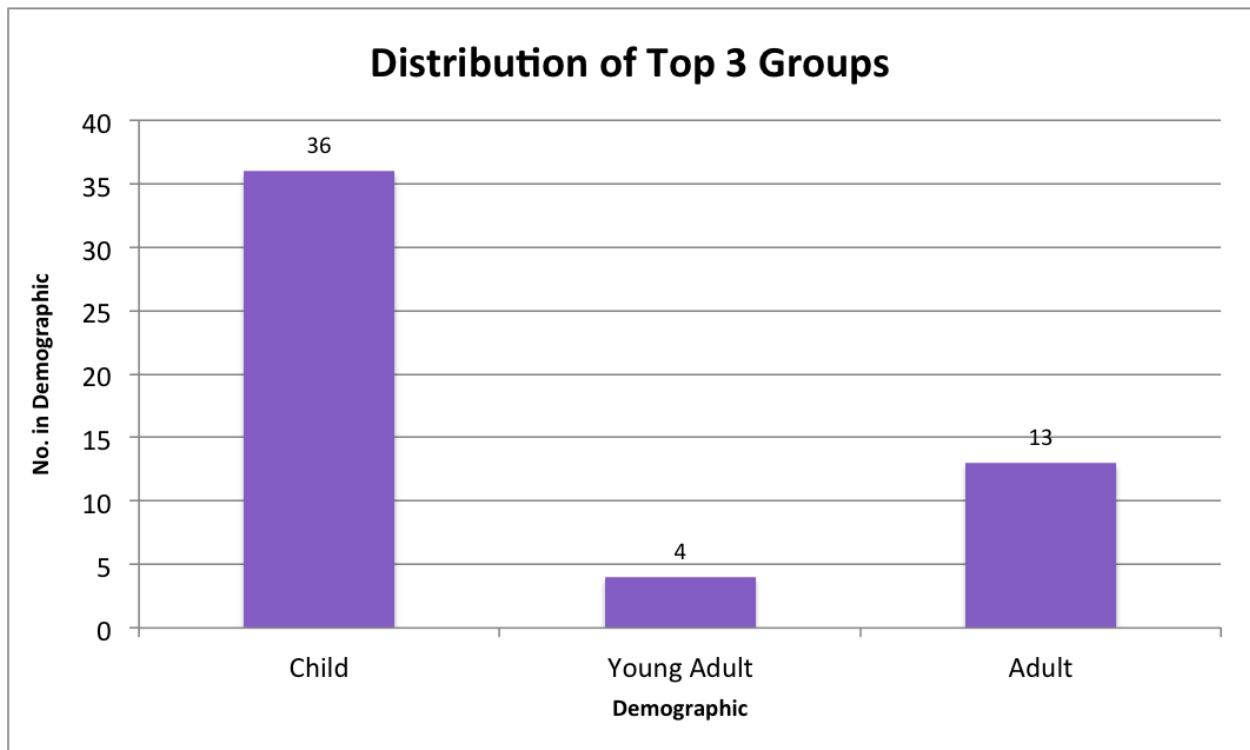


*Figure 1 - Visualization of Distribution of Experiences at the Hochschulspektakel*

Approximately half of the people engaged at the festival had a “Good” experience, with nearly 80% having a “Good” or “Great” experience. Only one person had a “Bad” experience, a failure rate of less than 2%. This indicates that the methods used at the festival were appropriate and extremely successful. The lively dialogue from the presenters, as well as the complementary

visuals, such as the microbial solutions, appeared to facilitate increased dialogue and garnered interest from the engaged parties, leading to the good and great experiences that comprised the majority of experiences in the evening.

Furthermore, the efforts at the festival were very accurately focused, as indicated in the following diagram:



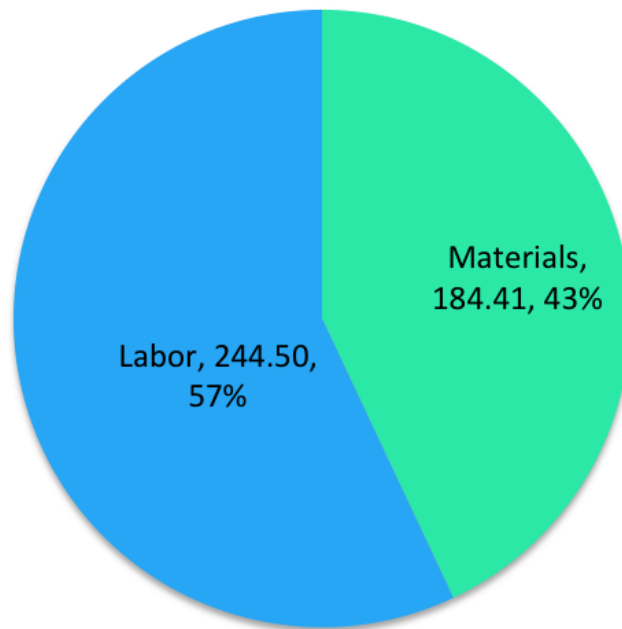
*Figure 2 - Visualization of Top Three Engaged Demographics at the Hochschulspektakel*

The primary target group, children, comprised a significant majority of the people engaged at the festival. This indicates two things. First of all, the Hochschulspektakel is a great event for having access to a large crowd of the miwelt project's target demographic. Having such a high concentration of primary school aged children in one location allows the miwelt project to quickly and efficiently spread awareness about itself and achieve its goals of promoting dialogue and garnering interest about microbial biotechnology. Second of all, it indicates that the presenters of the miwelt project, Melanie and Valentina, spent the majority of their time engaging the target audience. Although children did not make up 100% of the engaged population, the addition of

young adults and adults in the groups engaged should not be seen as a detriment; engaging these two groups could lead to more awareness of the miwelt project through word-of-mouth or social media. The above chart also indicates the total amount of people engaged during the festival. It should be noted that on the day of the festival, the weather was rather unfavorable - cold temperatures, wind, and rain. As such, it is logical to assume that the overall festival turnout was significantly lower than expected, which in turn, limited the amount of people in the target group of the miwelt project that were in attendance. Over the course of approximately two hours, 53 people total were engaged, or approximately 26 per hour.

In order to provide a more comprehensive and objective overview of the miwelt project at the Hochschulspektakel, a financial analysis was also performed. Through research and interviews, financial data on material and labor costs were gathered and then analyzed to provide a more detailed cost breakdown of the festival. Unfortunately, at the time this report was written, several financial figures were still missing and as such, not all values discussed here are final. However, a substantial amount of data was gathered, and an initial financial overview can be confidently discussed. Preliminary calculations show that the total cost for the miwelt project to attend the festival was CHF 428.91. This includes all labor costs (~57% of total costs), as well as the majority of the material costs (~43% of total costs).

## Material and Labor Breakdown



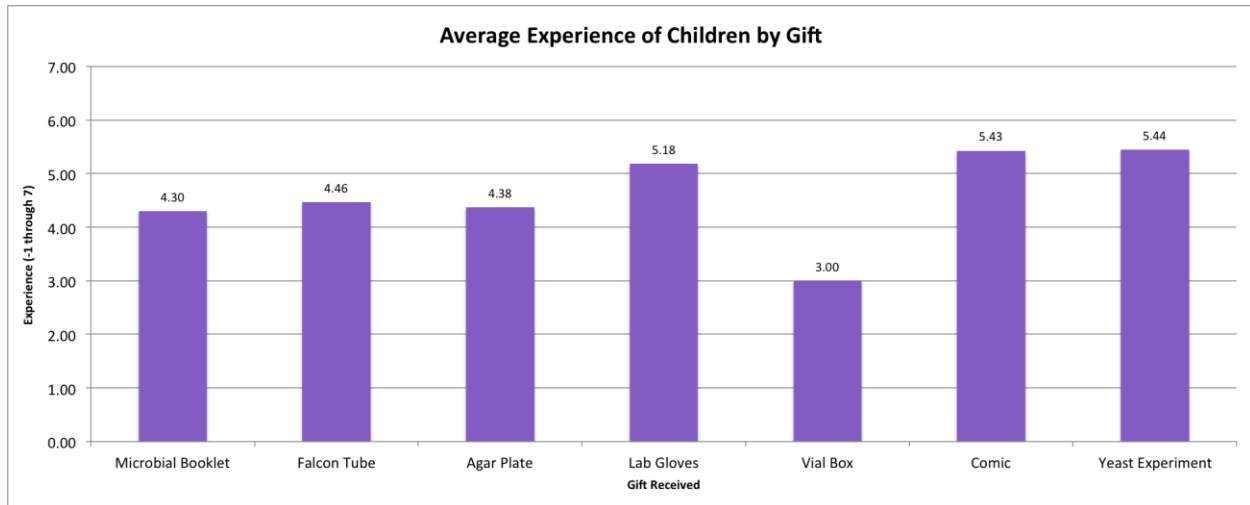
*Figure 3 - Visualization of Categorical Breakdown of Total Festival Cost*

A more detailed cost breakdown for the festival can be found in the Appendix; see Figure 58: Itemized Breakdown of Total Festival Cost. However, four values are not finalized in this calculation: the cost of the vial box gift, the cost of the yeast balloon experiment gifts, the cost of the “Please keep closed” stickers for the agar plates (likely inconsequential), and the cost of the comic book gifts distributed. Based on comparisons to similar gifts, and logical inferences as to the costs of the items, the total cost of the festival is likely to be approximately CHF 500. This means that the average cost to engage each of the 53 people at the festival was CHF 9.44 per person. These two figures, combined with the qualitative results of the festival discussed earlier, make the Hochshulspektakel a very affordable event for the miwelt project. The festival is by far the cheapest event for the miwelt project; although we did not attend or perform financial analysis for any other events, a review of existing financial documentation for other events indicates that the costs for other events are significantly higher than the cost for the Hochshulspektakel. For example, the budget for one Ferienpass (kid’s day) was CHF 7,812,

nearly sixteen times the cost of the Hochschulspektakel. While the duration of this event is certainly longer than the duration of the festival, its significant cost likely lowers its cost-effectiveness relative to the festival. Another event, the SCNAT Jubilee, was budgeted CHF 4,302, over eight times the cost of festival. There is currently no data to measure the effectiveness and overall experiences of the people engaged at these two aforementioned events and as such, no direct comparison can be accurately drawn to the festival. However, it is safe to say that as a result of the significantly lower costs of the festival and the generally “Good” and “Great” experiences had by the people engaged, the Hochschulspektakel is a very positive and effective event for the miwelt project.

While a broad, top-level analysis of the festival is certainly useful, it is also useful to understand the specific details of each aspect of the festival, primarily the factors that affected people's experiences. Since the distribution of gifts was a major focus of miwelt activity at the festival, an in-depth analysis of the gifts was performed in order to see how different gifts compared to each other in terms of experience, dialogue, and interest levels and cost-effectiveness. Furthermore, in order to attain even more relevant results, a significant portion of our analysis focused purely on how various gifts impacted children's experiences, interest levels, and dialogue levels. This type of focused analysis would allow us to better understand how to provide the best experience for the miwelt projects target demographic and eventually provide more focused, concrete recommendations. Analyzing the average experience level of children by the gift they received was a natural start, and the results revealed more than initially expected:





*Figure 4 - Visualization of Distribution of Children's Average Experience by Gift*

One result catches the eye immediately, and that is the significantly lower average experience of the vial box relative to the other gifts. We determined that this result was inconclusive - a review of the data collected from the festival showed that only one vial box gift was given out the entire evening. As such, no meaningful conclusions can be drawn from the experience level it resulted in. Reviewing the top three gifts in terms of average experience also revealed several interesting points. According to our results, the top three gifts, in descending order, are the yeast balloon experiment, the comic book, and lab gloves. We believe that the average experience of the lab gloves was inflated. This is due to the fact that this chart takes into account the experience levels of all children for each gift, without regard as to how many gifts each child received. A review of our data shows that the vast majority of children who received gloves also received at least one more gift, which likely improved their experience and consequently, falsely inflated the average experience of lab gloves. The results of the comic book share a similar story, though in reverse order. As the comic book was in fairly limited supply, it was typically only given out to those who showed a high level of interest initially. As such, it is possible to conclude that the comic book is a gift that does lend itself to a high overall average experience. Lastly, the yeast balloon experiment was extremely successful, attaining

the highest average experience score. As such, this is a gift we believe is worth keeping for future attendance at the Hochschulspektakel.

One gift, however, did not attain the average level of experience that we were hoping to see: the agar plate. This gift was by far the most deeply connected to microbial biotechnology, and was really able to show microbes at work (with a slight delay for cultivation). Children received a long explanation as to how the agar plates were created and what they were supposed to do. As such, the lower than expected average experience was slightly discouraging, especially given the amount of effort and money that was invested into the agar plates. To further understand the differences in each gift, a deeper analysis of the experience metric was performed; instead of looking at just the overall average experience, the average level of interest and average level of dialogue for each gift was calculated. Average level of interest by gift was analyzed first, and the results are more encouraging:

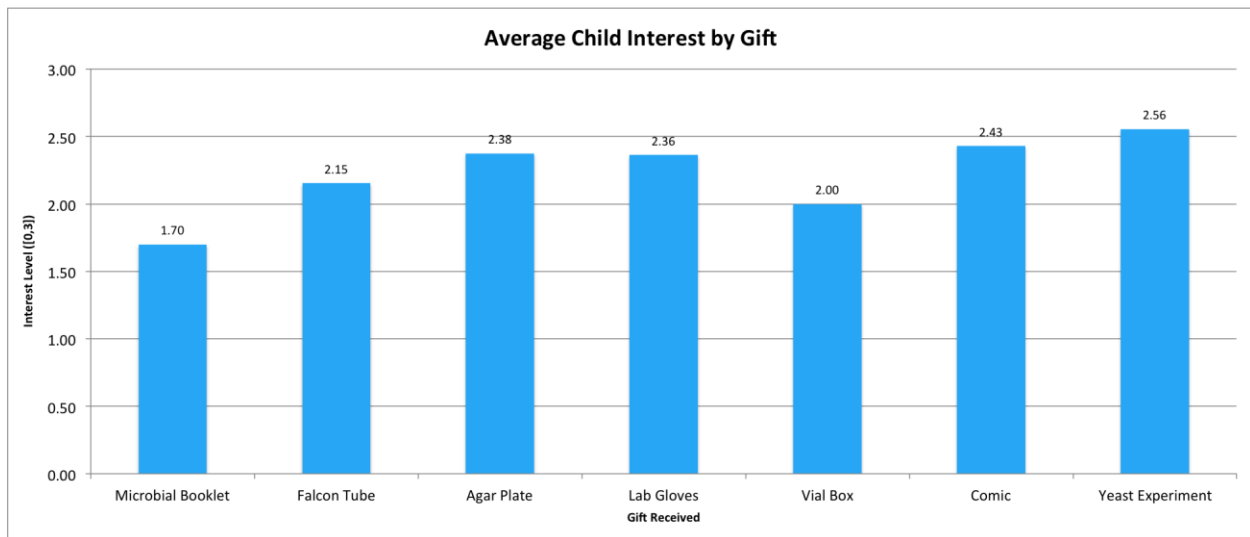


Figure 5 - Visualization of Distribution of Children's Average Interest Level by Gift

As before, the yeast balloon experiment and the comic score very high, further indicating that they are very successful gifts. The result for the agar plate is much more encouraging, scoring third highest at 2.38 points - this places it in between medium and high levels of interest, indicating its success at generating interest. Once more, the result for the vial box is

inconclusive, but the low level of interest generated by the microbe booklet is noteworthy, as it is the only gift that fell below “medium” average interest. The reason for this lower level of interest is likely to be the nature of the microbe booklet: it is not a particularly engaging gift, but rather a small piece of literature which struggles to capture the interest of children unlike the more enthralling yeast balloon experiment booklet. Lastly, the average level of dialogue for each gift was also calculated, and the results from this analysis assist greatly in understanding the intricacies of each gift:

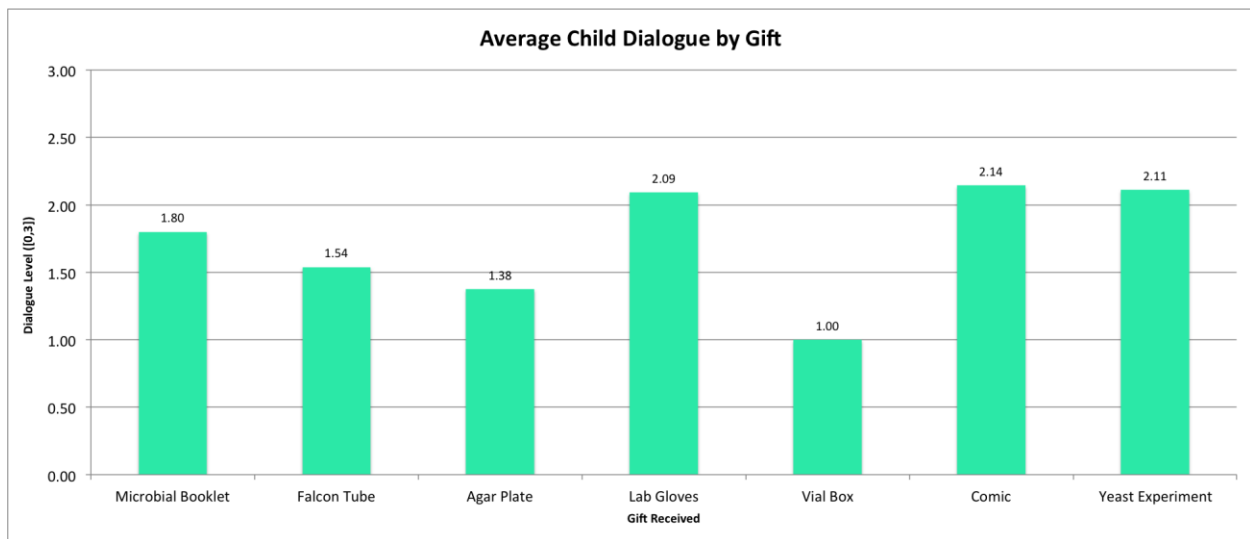


Figure 6 - Visualization of Distribution of Children’s Average Dialogue Level by Gift

As before, the comic book and yeast balloon experiment scored the highest, which confirms their success as gifts that align with the goals of the miwelt project. Furthermore, this chart reveals an interesting bifurcation surrounding the agar plate, and offers an explanation as to why the average experience of this gift was lower than hoped. If the vial box is removed from the gifts displayed in this chart, the agar plate suddenly has the lowest level of average dialogue, at just 1.38 points; this places it close to “Minimal” on the dialogue scale. This is in stark contrast to the level of interest generated by the agar plate, which was one of the highest out of all the gifts. It is believed that this bifurcation arises as a result of the level of complexity of the agar plate. When a child is gifted the agar plate, very few are likely to have any idea what it

is - so while they are interested, they cannot discuss it, which leads to a very one-sided conversation led by the member of the miwelt project providing the explanation. As such, there is room for improvement in the way in which the agar plates are presented, as more dialogue between the engaged children and members of the miwelt project would likely lead to a higher overall average experience for the agar plates gift, justifying the significant investment needed to produce them. Overall, reviewing the average experience, interest level, and dialogue level of each gift leads to the conclusion that the most effective gift at the festival was the yeast balloon experiment. This gift scored the highest in overall average experience, highest in average interest level, and second highest in average dialogue level. It captured young children's' attention and got them to discuss microbial biotechnology, directly fulfilling the goals of the miwelt project. Furthermore, it allows children to practice with microbial biotechnology concepts at home. This allows them to explore biotechnology further, perhaps increasing their interest in the subject. As such, the yeast balloon experiment is a very successful gift and should be considered for the miwelt project's future attendance at the Hochschulspektakel.

One additional factor that was investigated was the effect on overall average experience of giving out more than one gift. Although this analysis was not performed with a specific focus on children at the festival, the vast majority of those engaged who received more than one gift were children, and as such, the results indicated here can be safely interpreted as children's reactions to multiple gifts. This piece of analysis is perhaps the most straight-forward here, with a clear pattern arising:

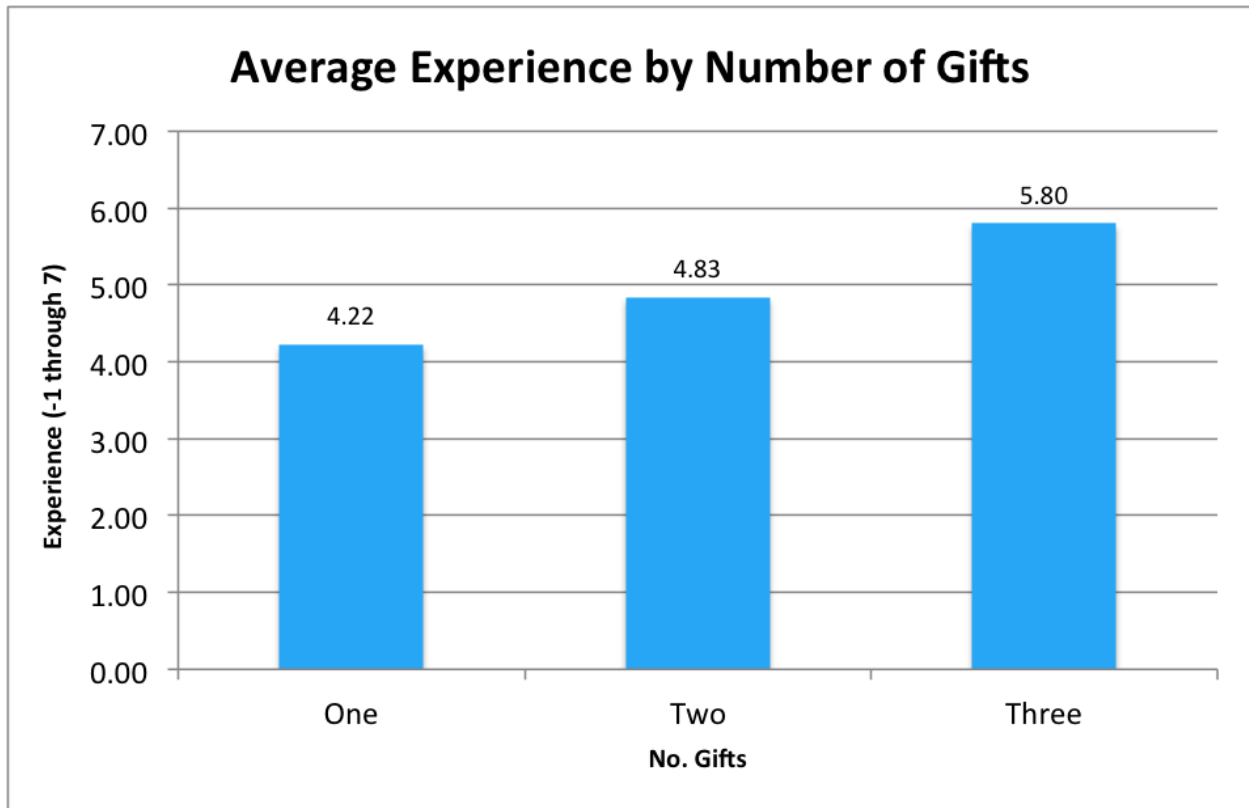


Figure 7 - Visualization of Distribution of Average Experience by Number of Gifts

The chart reveals that the more gifts a person receives, the higher their average overall experience level. This should not come as a surprise, but investigating the numbers in more detail gives a little more information about the true effects. Going from one gift to two raises the average experience level from 4.22 to 4.83, an increase of approximately 14.5%. Increasing the gift level from two to three further increases the average experience from 4.83 to 5.80, an increase of approximately 20%. Lastly, increasing the number of gifts from one to three raises the average experience by 1.58 points, or approximately 37.4%. This is a substantial increase, and could be a useful strategy for improving the experience of engaged parties at the festival. However, despite the trend revealed here, distributing an excessive number of gifts to children at the festival should be avoided. Giving out multiple gifts to every single child would become very expensive. Furthermore, it would take much more time to explain multiple gifts to every single child, and as such, fewer children would be engaged at the festival overall, decreasing

the effectiveness of the event overall. Therefore, unless a strategy is developed that would allow for more efficient utilization of time and an affordable ratio of cost to number of gifts, giving two or more gifts to each engaged party at the festival should be avoided.

After reviewing the effects the various gifts had on the levels of experience, interest, and dialogue, a more detailed financial analysis was necessary to determine the financial implications of each gift. Using information acquired through independent research and supplementary information provided by our sponsor, a more specific, itemized cost breakdown was provided for the majority of the gifts. Unfortunately, as of the time of writing this report, several values were missing: the cost of the vial box gifts, the cost of the experiment booklets for the yeast balloon experiment, and the cost of the comic books. As such, no concrete financial information can be provided for these gifts. Although the cost of the “Please keep closed” stickers for the agar plates were also missing, it was decided that this cost would be inconsequential and reporting slightly inaccurate information for the agar plates would be more useful than omitting it entirely. The calculations led to the following results:

- The cost to acquire and give out 14 microbial booklet gifts is CHF 16.24, or CHF 1.16 per gift.
- The cost to acquire and give out 18 falcon tube gifts is CHF 3.64, or CHF 0.20 per gift.
- The cost to acquire and give out 12 lab gloves is CHF 3.70, or CHF 0.31 per gift.
- The cost to produce and give out 15 agar plates is CHF 160.26, or CHF 10.68 per gift.

More detailed cost breakdowns for each gift can be found in the Appendix; see Figures 50 - 56. The calculations show that gift prices range widely, and suggest that the costs of gifts tend to increase as gift complexity increases. This data also supports the notion that the agar plates are significantly more expensive than the other gifts due to the more labor intensive process of producing them. In fact, labor accounted for CHF 105 of the total cost of the agar plates, or

approximately 66%. Finding alternative methods of production, whether it be through more efficient material utilization, less expensive labor, or outsourcing the process entirely, would go a long way in reducing the cost of the agar plate gifts for the Hochschulspektakel.

To supplement the cost calculations for each gift, the cost-effectiveness of each gift was also calculated. As mentioned earlier, there were several costs that were missing from our repository of financial information. This means that when measuring the cost-effectiveness of each gift, it was not possible to provide accurate values for the vial box gift, the yeast balloon experiment gift, or the comic book gift. In order to provide cost-effectiveness ratios for the remaining four gifts (microbe booklets, falcon tubes, agar plates, and gloves), the average experience level, average interest level, and average dialogue levels for each gift were divided by the cost to produce one unit of each gift. This table of calculations can be found in the Appendix; see Figure 57: Distribution of Cost-Effectiveness Ratios for Gifts. As the goal is to maximize experience, interest, and dialogue, while minimizing the cost, the higher the value (and consequently the higher the bars on the chart) the better. The cost-effectiveness analysis is visualized here:

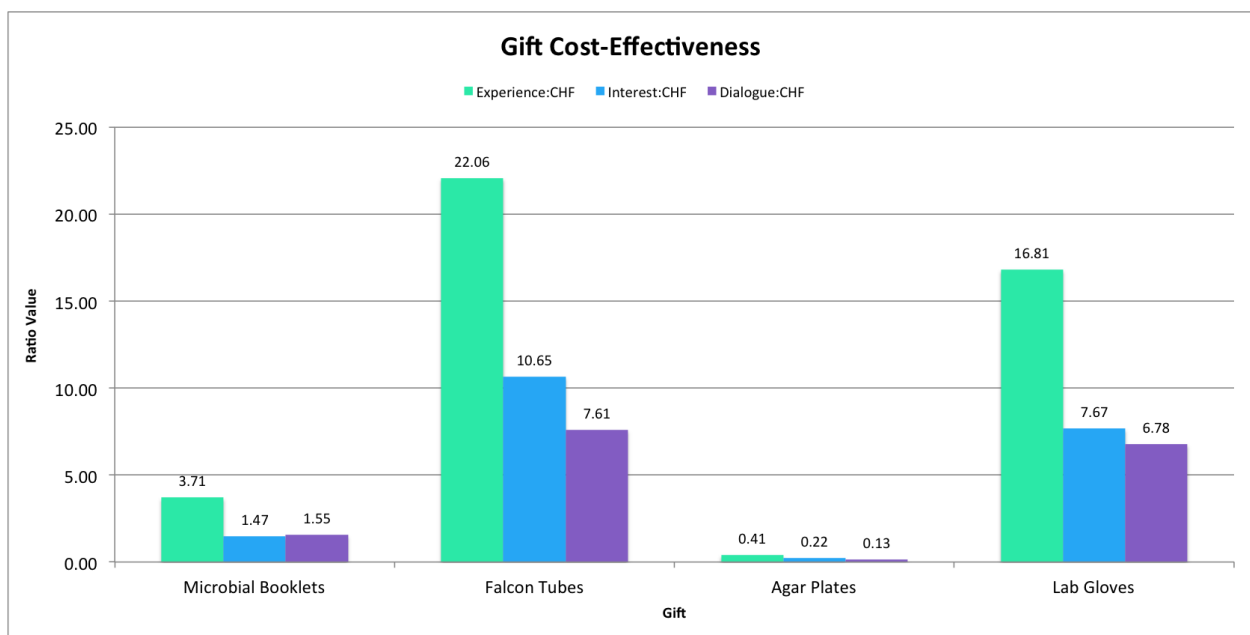


Figure 8 - Visualization of Distribution of Cost-Effectiveness Ratios for Gifts

After performing this analysis, it was found that the falcon tube gift was the most cost-effective, scoring consistently higher than the remaining three gifts in Experience:CHF, Interest:CHF, and Dialogue:CHF. The lab gloves also performed very well in this regard, though as discussed previously, these results may be inflated. The microbial booklets did not perform as well as either the falcon tubes or lab gloves due to the overall lower scores in the three metrics, as well as their higher cost. Finally, the agar plates were significantly less cost-effective than desired. This does not make the agar plate a bad gift, but rather shows that there is significant room for optimization in their production or acquisition. Although the agar plates scored reasonably well in average experience, their extreme cost relative to the other gifts decreased their cost-effectiveness dramatically. Lastly, although nothing can be definitively said about the yeast balloon experiment due to missing information, it is believed that it would be very cost-effective due to its overwhelming success and relatively simple composition. The majority of the cost for this gift would arise from the printed experiment booklet, and if the price of the microbial booklet is indicative of typical printing costs for such booklets, this cost is unlikely to be very high. Although the cost-effectiveness of the yeast balloon experiment will be lower than the falcon tube, its success in generating interest and dialogue makes it worth the investment.

Overall, the festival was a very successful event for the miwelt project. The target group was well engaged and the event was relatively inexpensive. Analyzing the various gifts in terms of impact and finances revealed that this set of gifts varies wildly in terms of success and expense, and as such, it is possible to provide concrete recommendations for future attendance at the Hochschulspektakel.

## 4.2 Aggregation of Financial Data

In order to gain a better understanding of the financial situation of the miwelt project, financial information was collected through interviews and research and then aggregated in one document (see Figures 61 - 76). Through this aggregation and review, several key figures were



determined. First of all, the miwelt project received a total of CHF 206,092 from the Swiss National Science Foundation (SNSF) for two years, beginning on April 1st, 2014 and ending on March 31st, 2016. Of this CHF 206,092, CHF 176,092 falls under the AGORA funding scheme, with an additional CHF 30,000 funded separately by the SNSF in the first year. The AGORA funding scheme funds science communication projects (Agora - public communication.2015). In the first year of funding, the miwelt project received CHF 122,604 (including the CHF 30,000) and in the second year, received CHF 83,488. In addition to the funding provided by the SNSF, the miwelt project also received CHF 63,852 from ZHAW to cover projected operating expenses that exceeded the grants from the SNSF, bringing the total revenue over the course of two years to CHF 269,944. In order to gain a more comprehensive understanding of the expenses of the miwelt project, the financial data was divided into two primary categories: salaries and events. These two categories were believed to comprise the majority of the miwelt project's expenses.

According to the documentation received, CHF 113,204, or 64%, of the funding from the AGORA grant went to salaries for miwelt project members. From the remaining CHF 93,852 of revenue that miwelt received, a percentage also went to salaries; however, this figure was not uncovered during the collection of data. Itemized salary costs for the majority of miwelt project members, based on an hourly rate, were provided. From the information provided, it was determined that the following titles and parties receive this much compensation for their work:

- Lecturer - Karin Kovar: CHF 125
- WiMa (Senior Scientific Assistant) - Verena Looser: CHF 75
- Scientific Assistant - Melanie Ottinger: CHF 50

One part, however, was missing from the information provided: the cost of students performing work for the miwelt project. Fortunately, this value was not difficult to calculate. Through the values provided in Figure 73, Itemization of *Concept Development* for SCNAT Jubilee, the hourly rate for students was calculated to be CHF 30.

Events hosted and attended by the miwelt project comprised the second largest category of expense. There are three major events of interest to miwelt: Ferienpass, SCNAT Jubilee, and the Hochschulspektakel. As discussed previously, the Hochschulspektakel cost approximately CHF 500. This value was directly calculated through a cost breakdown of the materials and labor needed to perform the miwelt project activities at the festival. However, this is the only event with a direct calculation of total cost. The Ferienpass and SCNAT Jubilee had approximate, budgeted values, but no end figure for actual cost. Nonetheless, these values are still useful. The Ferienpass, an all-day event, had a budget of CHF 7,812, while the SCNAT Jubilee had a budget of CHF 4,302. While no actual cost figures exist for these events, these high budget values indicate that both of these events are significantly more expensive than the Hochschulspektakel.

While there are other costs associated with the miwelt project, salaries and events were believed to be the two biggest expenses. Furthermore, additional costs and itemizations were difficult to find at times, making more in-depth analysis difficult. For the remainder of the aggregated financial information, please see the accompanying tables in the appendix (Figures 61 - 76).

### 4.3 Survey on ZHAW: Campus Grüental

In order to gauge the Swiss public opinion on corporate sponsorship, we distributed a survey (Figure 77) to the faculty, employees, and students at ZHAW: Campus Grüental. As seen in Figure 90, most of the respondents who decided to reveal their demographic were students (52% of 141). The remaining demographic was composed of employees (38% of 141), and "other" (10% of 141). Of all the respondents, 25% had a biotechnology background. In total, the survey was distributed to 2236 recipients and received 231 responses (based on the number of started surveys) - this equates to an overall response rate of 10.3%. Each question differed slightly in their response rates. This survey included various questions specifically

regarding the respondent's feelings toward educational programs, biotechnology education in Switzerland, and the feelings toward Swiss biotechnology corporations. We were especially interested in the response to the question "Would you send your child(ren) to a free educational program in life sciences that is sponsored by a company?" A positive response to this question would imply that there is a minimal negative stigma surrounding corporate sponsorship.

When distributing the survey, we decided to only focus on the members at ZHAW: Campus Grüental due to time constraints. We expected this group to be fairly biased because information received from our sponsor indicated that members of Swiss academia desire that education remain independent from corporate influence. However, we believed this information to still be valuable as it provided a concrete perspective into the public's opinion of corporate sponsorship. Furthermore, as this subset of the Swiss public is likely to show the most apprehension to corporate involvement in educational programs, we felt that if they showed any acceptance to it, it is likely that other members of the Swiss public would be accepting as well.

The first question included three subsidiary questions: "Would you send your child(ren) to a free educational program in life sciences?", "Would you send your child(ren) to a free educational program in life sciences that is sponsored by a company?", and "Would you pay to send your child(ren) to a 1 day educational program in life sciences?". All of these portions received 179 responses, equating to a response rate of 8%. As aforementioned, we were particularly interested in the response to the question regarding corporate sponsorship. As seen by the figure below, 147 of the 179 respondents would probably or absolutely send their child to a corporately sponsored educational program. This means 82% of respondents to the survey displayed a non-negative viewpoint toward corporate sponsorship. We can deduce from the survey data that the academic population of ZHAW: Campus Grüental is generally in favor of corporate sponsorship of educational programs. As we felt this group would be the most apprehensive of corporate sponsorship, their acceptance indicates a high likelihood that a significant portion of the Swiss population would accept it as well. As such, there does not

appear to be a negative stigma surrounding corporate sponsorship of educational programs, and thus it is a viable funding method.

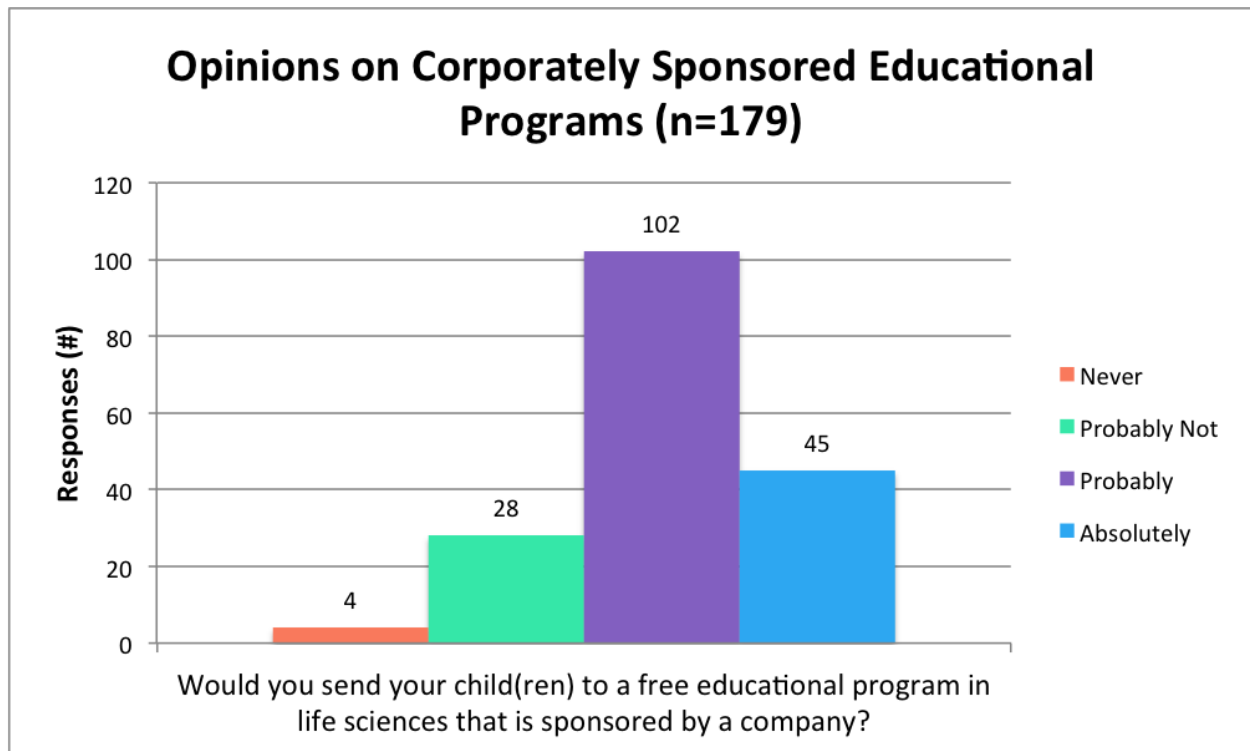


Figure 9 - Responses to Question 1b of the ZHAW Life Science Department Survey

The additional subsidiary questions showed similar results as the responses to the question regarding corporate sponsorship. As seen from Figure 80, 153 out of the 179 (85%) people who responded would send their children to a paid educational program in the life sciences. Additionally, as seen in Figure 82, those who would consider sending their children to a paid educational program would pay, on average, CHF 103. The question regarding the maximum price one would pay was presented to anyone who did not answer “never” as a response to sending their child to a paid educational program. The initial data had several outliers which did not make sense for the question. Based on research of paid educational events, a one day event is generally under CHF 250. To account for some outliers, we removed values greater than CHF 1,000 before calculating the average. While the positive opinions of paid educational programs closely mirrored those for corporately sponsored events (85% vs

82%), the opinions of free educational programs were overwhelmingly positive (see Figure 79). Of the 179 that responded, 176 would probably or absolutely send their child to a free educational program in the life sciences. Opinions on this subject were 98% positive, and even more apparent was the fact that nobody answered that they would never send their child to a free educational program in the life sciences. The positive opinions on these educational programs show that Swiss people are generally willing to send their children to life science educational programs, whether free, paid, or sponsored by corporations.

From the survey, we found a mostly neutral or better opinion toward Swiss biotechnology corporations. From Figure 84 we can see that 132 of the 147 (92%) people answered that they show a neutral perspective, a liking of, or strong liking toward biotechnology corporations. In addition, 47% of the 147 people who answered the question showed a like or strong like toward biotechnology corporations. We can deduce that the academic population of ZHAW: Campus Grüental does not perceive biotechnology corporations negatively, revealing the lack of a stigma surrounding biotechnology corporations. As a supplemental question, we asked if there were any biotechnology corporations that influenced the respondent's answer to their opinion of biotechnology corporations. As seen in the word cloud below, Novartis, Roche, Monsanto, Syngenta, and Lonza proved to be the top five largest influences. Due to the apparent acceptance of biotechnology corporations and corporate sponsorship of educational events, these are potential corporate sponsors which the miwelt project could reach out to if the project members decide to pursue corporate sponsorship as a funding method.



Figure 10 - Responses to Question 3 of the ZHAW Life Science Department Survey

The last two questions of interest regard microbial biotechnology education in primary schools, specifically regarding the quantity and the quality. Both questions received 144 responses, yielding a 6.4% response rate. In regards to the opinion on the quantity of microbial biotechnology education in primary schools, 69 of the 144 respondents (48%) felt there was not enough of it (see Figure 86). In addition, 80 of the 144 respondents (55%) felt that the quality of the education was either okay or poor (see Figure 88). The most critical data emerged from the fact that no respondents felt there was too much microbial biotechnology education in primary schools and no one felt that the quality of it was excellent. We can deduce from these data that the amount of microbial biotechnology education can certainly increase and the quality has room to increase as well. In conclusion, there is a market for educational outreach programs that aim to increase the exposure of primary school students to microbial biotechnology.

#### 4.4 E-book

Currently the miwelt project's comic book exists as a printed edition as well as a PDF variant that is on the project's website. In order to gain access to the comic, one needs to either

attend an event to receive a physical copy from a project member, or discover its existence on the project's website. Due to how difficult it is for someone to attain the comic book, it is safe to say that there is a significant portion of the target audience that cannot currently access it. Electronic children's literature is on the rise, and due to its popularity, converting the comic to an e-book could result in the miwelt project's comic becoming more accessible.

Converting the miwelt project's comic to an e-book format is a feasible venture. The costs of converting the miwelt project's comic book can range from approximately \$250 to \$800 and is based primarily on the amount of images present in the book (Booth, 2015). If the prospective book contains many images and is very long, the cost to reformat the book will be substantially higher than a shorter, mostly text-based book. "ABC" by Brigitte Brocato contained mostly images, was 60 pages long, and cost around \$250 to convert to an e-book format in 2012 (Brocato, 2015). The miwelt project's comic is much shorter and also contains mostly images, although there is much more text present. Therefore, the cost of reformatting the comic should be on the lower end of the range, and thus should be a minimal cost to the project.

Converting the miwelt project's comic to an e-book format can at a minimum expand the audience of the project beyond Wädenswil and can also serve as a reliable source of income. Currently, there is a variety of electronic children's literature available for download, and some can be especially profitable. Two books that fall slightly outside the genre of the miwelt project's comic are "The Long Haul: Diary of a Wimpy Kid" and "Dragonbreath #1." Both of these are highly rated and fall under the general genre of "children's electronic literature." "The Long Haul: Diary of a Wimpy Kid" currently has a rating of 5/5 stars with 2402 written reviews, and a download price of \$7.29 on the Amazon Kindle store (Kinney). "Dragonbreath #1" currently has a rating of 4.7/5 stars with 86 written reviews, and can be downloaded for a price of \$6.99 on the Amazon Kindle store (Vernon). Assuming a response rate of 10% for those that choose to review the books, "The Long Haul: Diary of a Wimpy Kid" and "Dragonbreath #1" received 24,020 and 860 downloads, respectively.

Searching for “kids’ science books” on Amazon results in “The Everything Kids’ Science Experiments Book: Boil Ice, Float Water, Measure Gravity-Challenge the World Around You!” as the top rated book in the category (Robinson). This piece of literature is a compilation of experiments for children that can be done with common household items. It currently has a rating of 4.5/5 stars with 526 reviews and is available from the Amazon Kindle store for \$5.36.

The same search terms also return “The Curious Kid’s Science Book: 100+ Creative Hands-On Activities for Ages 4-8.” This is a similar interactive children’s experiment book that aims to get children to “ask their own scientific questions, discover value in failed experiments, and most importantly, have a blast with science.” Currently, it has a rating of 5/5 stars with 50 written reviews and is available from the Amazon Kindle store for \$8.49 (Citro).

Both of these books fit within the same genre of the miwelt project’s comic book, which is a piece of children’s educational science literature and are representative of the potential for the miwelt project’s comic as an e-book.

Assuming a response rate of 10% for those that chose to review the pieces of literature, “The Everything Kids’ Science Experiments Book: Boil Ice, Float Water, Measure Gravity-Challenge the World Around You!” and “The Curious Kid’s Science Book: 100+ Creative Hands-On Activities for Ages 4-8” received 5,260 and 500 downloads respectively. On Amazon, authors receive 60% of the price of each book that is downloaded (Brocato, 2015). Based on these values and their current prices on Amazon, “The Everything Kids’ Science Experiments Book: Boil Ice, Float Water, Measure Gravity-Challenge the World Around You!” has generated \$16,916.16 of revenue and “The Curious Kid’s Science Book: 100+ Creative Hands-On Activities for Ages 4-8” has generated \$2,547.00 of revenue. While the figure for this book seems low in comparison, it should be noted that this book was uploaded on September 8, 2015, and thus the figure is substantial due to it being earned in under a month.

“ABC” is a children’s English to German alphabet book written and illustrated by Brigitte Brocato. When “ABC” was originally converted to an e-book in 2012, it was published as a free



download, and was downloaded 947,939 times between 2012 and 2014 (Brocato, 2015). For the past year, it has been available as a paid download and Brigitte sells between 100 and 200 copies per year (Brocato, 2015). Based on these figures and the current download price of \$4.99 on the Amazon Kindle store, Brigitte earns between \$299 and \$598 per year, and does so with minimal advertising efforts (Brocato, 2015).

It is clear that electronic children's literature is quite popular. All five examples cited here demonstrate high ratings and number of downloads, indicating that this format of literature is not only widespread, but also well received. Furthermore, electronic educational literature is able to provide a steady stream of income. Even at the low end of the revenue range, the miwelt project's comic book as an e-book can pay for its reformatting costs, and should do so in one year or less. As an e-book, the comic will be easier to distribute on a more widely accepted platform, such as Amazon Kindle, than it would be in its physical format. At the high end of the revenue range, an e-book can be extremely profitable for the miwelt project.

## 4.5 Crowdfunding

Effective crowdfunding stories portray their organizers as passionate, interesting personalities and implore the contributors to help give the project the last push it needs to be successful. Almost anything has the potential to be crowdfunded, but the most successful projects create an enticing story (Lawrence, 2012). Take the "Coolest Cooler" project for example. This project was focused on funding the production of a multi-purpose beverage cooler. One of the major strengths of this project was its portrayal of its creator, Ryan Grepper (Grepper, 2014). He was portrayed as a down-to-earth and practical guy. Parts of his personality, such as his sense of humor and laid back demeanor, were emphasized through a clever video that incorporated jokes and short clips of him and his friends hosting get-togethers with the product. As such, Grepper was portrayed as a real, likeable person rather than a faceless businessman. This helped the community connect with him on a more personal level,

and consequently, led to the successful funding of his product. Grepper revealed the “Coolest Cooler” as being virtually complete, with only the production left to fund (Grepper, 2014). It was implied that within a few months, backers would have their own Coolest Cooler. This prospect enticed many individuals to support the project. In this case, it has been over a year and many backers still have not received their Coolers. Regardless of whether or not the project can be completed quickly once funded, portraying it as such during the funding period can secure additional backers.

Another example of a powerful story was the “Tinker Tour” project. The story behind this campaign again centered around the project organizer, Mary Beth Tinker. The story told the tale of Tinker’s childhood battle for freedom of expression and the continuation of that battle with the “Tinker Tour” project (Tinker, 2013). She was portrayed as a champion for justice and equality who would sacrifice large portions of her time to teach people about the United States Constitution. Much like the “Coolest Cooler” campaign, Tinker implored the community’s help to fund the material costs of her project and heavily implied that her tour could begin almost immediately after funding was complete. She urged the community to give her project the final push it needed to be completed (Tinker, 2013).

The “Vinyl Hearts Compilation” project utilized the same effective storytelling of the previous campaigns, but did so without using a video medium (Kaplan, 2015). Through text, the organizers were able to create the story for their event that portrayed them as philanthropes invested in their local community. Through jokes and idiosyncratic vernacular, they portrayed themselves as quirky and interesting. To make up for their lack of video, they utilized personal contacts within the community and social media to help display their unique personalities. Thus, even though they never directly showed themselves to the public, they were still able to avoid the pitfall of appearing as a faceless organization. Much like other projects, when the organizers asked for the community’s help, they did so with the implication that the project was completely developed, lacking only funding for materials and the venue.

In summary, successful crowdfunding campaigns have many similar features. Firstly, they all create a story centered around the project organizers that portrays them as unique, passionate, likable individuals. The best way to do this appears to be through the introductory video that many crowdfunding websites allow, and supplementary text can help accomplish this. Showing the project organizers' personalities makes them seem relatable and emphasizes that the project is their passion rather than the business venture of a faceless organization. In essence, the more personality, humor, intelligence, creativity, etc. the organizers show, the higher their backers will reward them (Key, 2014). It is also important to emphasize, whether true or not, that the project is nearing its completion and only requires the community's support to complete. This makes backers feel like they are funding the production of a finished product rather than taking a risk on a new idea. This also makes the project appear extremely well planned, further improving the credibility of the organizers. From this analysis we will be able to recommend how to shape crowdfunding stories the miwelt project produces so that they receive the most support possible.

When crowdfunding a project, one of the best ways to secure backers is with rewards. Effective crowdfunding rewards are often limited edition and personally handled by the project organizer. "Augie and the Green Knight", crowdfunded children's book by Zachary Weiner, offered backers a limited edition hardcover copy of the book. Out of the 9,044 project backers, 4,222 pledged enough to receive the hardcover book. An additional 2,085 pledged to receive signed copies of the book (Weiner, 2014). The draw of limited edition material encourages potential backers to pledge a higher amount than they normally would to receive these collectors items.

Another example of interesting and effective rewards were the vinyl records given out by the "Vinyl Heart Compilation" project. Backers pledged \$1,446 to receive custom, heart-shaped records the organizers created. The record design was unique to the event and came just in time for Valentine's Day (Kaplan, 2015). The combination of the limited edition nature of these

records and the stellar timing by the project organizers helped secure them 146% of the required funding for the event. The “Tinker Tour” project offered limited edition armbands for any backers who pledged over \$250. 56 of their 226 backers pledged to receive these armbands. A separate 57 backers pledged to receive personally written and signed postcards from Mary Beth Tinker during her tour (Tinker, 2013). These unique and organizer-handled rewards are once-in-a-lifetime memorabilia that many people are willing to pay for, especially if it means supporting a community outreach program.

Many of the above rewards are effective for smaller contributions, but appealing to larger contributors is also important. Effective rewards for larger contributions often involve conceptual input or personal meetings with the project organizer. The Asylum Seeker Resource Center (ASRC) “Food Truck” project offered a personal dinner with the project organizer for pledges of \$5,000 or more. Five individuals pledged to attend this dinner. Ten (of ten maximum) backers pledged \$1,000 dollars to divert the food truck to a location of their choice so they could meet and interact with the organizers and other volunteers on the truck (“The ASRC Food Justice Truck”). The ASRC are not alone on this. The “Pillars of Eternity” team rewarded pledges of \$10,000 or more with a full day of playing board games with the developers of this crowdfunded video game. Five individuals pledged to receive this reward. The “Pillars of Eternity” team also offered conceptual input on the game to backers pledging \$5,000 or more. Said backers would be able to design an encounter for the final version of the game. A total of eight individuals received this reward (“Pillars of Eternity,” 2012). These significant rewards for large contributions show the backers that their money is going towards a real project. It emphasizes that they are helping the project organizers realize their passion and secures in their minds that their investment was worthwhile and is very much appreciated. This is incredibly important for securing such a large contribution in the first place, but is vital for maintaining them as repeat backers on future projects. This analysis provides us with insight as to what makes an

incentivising crowdfunding pledge reward, helping us come up with enticing rewards tailored to the miwelt project.

The aspects of the miwelt project that are appropriate to crowdfund are the conversion of the comic book to an e-book, the continued development of the comic book, and some of the day-long events. There have been many successful examples of crowdfunded books. “The Leader’s Guide” by Eric Reis received \$135,000 within one day of the project launching (Reis, 2015). It had over 9,000 backers and raised upwards of \$500,000 by the close of the funding period. Another successfully funded book was “Augie and the Green Knight” by Zachary Weiner. This children’s adventure book received \$384,000 in one month of funding (Weiner, 2014). “Eureka! The Art of Science” is an art book that aims to use its content to teach children about science and scientists. After only 20 days of funding, this book had received 325% of its target goal (“Eureka! The Art of Science,” 2015). Many of these examples are books developed in the United States, but crowdfunding books in Switzerland is on the rise as well. “The Riddle of the Sphinx” is a art-poetry fusion book created by Whitney Sparks, a Swiss citizen. With only 17 backers, this project raised \$2,315 (Sparks, 2012). “Error and Loss”, written in Hasliberg Goldern, Switzerland, raised almost \$14,000 in January of 2015 (Curtis, 2015). These examples demonstrate the success of funding book development through crowdfunding. From this data and additional research presented in the literature review, we can see that the development of a book, including the conversion to an e-book, is appropriate to crowdfund.

With the estimated cost of converting a physical book to an e-book being between \$250 and \$800 and many independent publishing projects receiving thousands of dollars from crowdfunding, it is entirely possible to crowdfund the conversion of the miwelt project’s comic book to an e-book. However, with over CHF 16,000 being allocated to the miwelt project’s writer and only one chapter of the comic book being produced over the course of two years, it is unlikely that crowdfunding will generate enough income to sustain its development at this rate and cost.

Another type of project that can successfully be crowdfunded is a local day event. For the purpose of this analysis, a day event refers to some form of festival or gathering that individuals of the public can attend. To qualify as local, the event's target audience must primarily reside in close proximity to the event location. One example of this was the "One Take Super 8" project. This Syracuse, New York independent film festival was able to raise \$565 from 26 local contributors ("One Take super 8 Event," 2015). A slightly larger example was the "Vinyl Heart's Compilation" music festival. In January of 2015, 72 backers contributed a total of \$1,446 to make the event successful (Kaplan, 2015). The "Accidental Festival" is a London, England based art education and appreciation festival that has been funded successfully for over 9 years ("Accidental Festival 2013," 2013). Each year they typically receive between 1,000 and 2,000 British pounds. It is worth noting that each of these events also charged entrance fees so the funding secured is lower than the actual cost of the event. These examples demonstrate that local day events can be successfully crowdfunded.

From the examples we have collected, we can estimate that a local day event can generate between CHF 500 and 2000 CHF through crowdfunding alone. The Hochschulspektakel, which cost CHF 500, falls within this range. As such, it has a high possibility of being successfully crowdfunded. Ferienpass, another day event of the miwelt project, was budgeted for a total of CHF 7,812. At this current level of cost, there is a very low likelihood of this event being funded completely by crowdfunding. The SCNAT Jubilee, another of the miwelt project's local day events, has CHF 3,411 budgeted for labor and material costs. Thus, assuming no further concept development is made for this event and subsequent execution costs are comparable, there is a low likelihood that it can be fully crowdfunded. Finally, there are plans to extend the miwelt project's activities to Swiss primary school classrooms. These excursions, if they fall within the expected funding range, have a chance of being crowdfunded. However, due to the more private nature of these events, it is possible that less funding can be secured as many backers will be unable to participate in these outreach

events. From this analysis, we will recommend which areas of the miwelt project can best be fully or partially funded via means of crowdfunding.

# 5.0 Conclusions and Recommendations

## 5.1 Hochschulspektakel

Overall, the Hochschulspektakel was a very successful event for the miwelt project. It generated a lot of interest and dialogue in the miwelt project's target demographic for a relatively low cost, and the majority of the parties engaged at the festival had a very positive experience. As such, we recommend that the miwelt project continue attending the Hochschulspektakel in future years. However, there are several areas where miwelt can optimize and improve in the preparation and execution of festival activities.

Firstly, more research into agar plates is recommended. While the agar plate is a great gift that displays microbial biotechnology well, it has several drawbacks that are worth addressing. One interesting facet of the agar plate gift is the delayed reveal of the message painted on it. As this message can take anywhere from multiple hours to days to reveal itself, there is currently no method to gauge the eventual reactions of receivers of this gift, and thus, no ability to measure the true experience had by a recipient of the agar plate gift. Developing such a method would help substantially in understanding the effectiveness and quality of the agar plate as a gift designed to pique young children's' interest in microbial biotechnology. One potential method is to bundle each agar plate with a mini questionnaire and a prepaid envelope that children can mail back once the image appears on their agar plates. Asking questions such as "What did you see?" and "What do you think about this?" would be a relatively simple way of gauging the effect the agar plates have once the recipients leave the Hochschulspektakel.

Another aspect of the agar plate gift that would benefit from optimization is the overall cost. Currently the agar plates are significantly more expensive than any other gift, making up a large chunk of total festival cost and lowering their cost-effectiveness dramatically. The majority of the cost of the agar plates comes from labor expenses, though material utilization could be improved as well. There are several potential methods of decreasing the cost of the agar plate



production process. One potential solution is to purchase pre-made agar plates from a third party vendor. Although no specific third-party solution was identified due to time constraints, any service that provides pre-made agar plates for purchase likely mass produces them and as such, is able to provide them at a lower overall cost than the cost of producing them onsite at ZHAW. Another potential method of dramatically reducing the labor cost is to utilize volunteers to produce the plates. Although this may require some initial training, based on our experience, the process is not too difficult and does not require much biotechnology knowledge to do correctly. Therefore, the ZHAW: Campus Grüental itself has a large pool of potential candidates for such a task. Volunteering in a lab is likely a very enticing prospect for life sciences students, and the deal can be sweetened even further through offers of food or drink vouchers at the Hochschulspektakel. If volunteering is not an option, rolling the production of the agar plates into an undergraduate course curriculum or lesson, and having students make the agar plates for classwork, would be a much cheaper method as all labor costs would be eliminated. Lastly, if none of these options are viable, optimizing the process as it currently stands is highly recommended. For this year's festival, a total of forty agar plates were produced - however, only fifteen were actually used for the festival. This means that twenty five agar plates, or over 60% of the total created, were not utilized. This is highly inefficient and increases the material costs substantially. Therefore, we highly recommend that for future festivals, the miwelt project produces only the amount of agar plates actually needed for the festival.

The gift box used at the festival can also be optimized. First of all, we recommend constructing or acquiring a reusable gift box. The gift box used this year is unlikely to be usable for next year, and as such, there is an opportunity to develop a long term solution. Creating a stronger, more durable box would require some level of initial investment, but would ultimately save money in the long run by eliminating all labor and material costs associated with its construction in future years. Second of all, we recommend a redesign of the box. This year's box had a flaw in its design that prevented access to many of the little trinkets inside. The flaw

revealed itself through the vial box gift - all of the mini vials inside that corresponded to the vial box became stuck underneath the sleeve of the lab coat. As such, only one person was able to receive this gift. Furthermore, many children struggled to pull their trinkets out of the box, due to the lab coat sleeve catching the gift and preventing the children from pulling their hand out. Redesigning the box to eliminate this structural flaw, and ensuring that the box is usable for multiple years would likely improve the experience for everyone at the festival and save money for the miwelt project in years to come.

In order to further improve the experience of engaged parties at the festival while minimizing costs, we recommend prioritizing several gifts for future attendance at the Hochschulspektakel. While no definite values could be provided for the cost-effectiveness of the yeast balloon experiment, the average experience was overwhelmingly positive and it was very successful at generating interest and dialogue. Based on its composition, it is unlikely to be significantly expensive when compared to other gifts and as such, we highly recommend continuing the distribution of this gift. Furthermore, if miwelt members see the need to distribute a higher quantity of gifts in the future, the yeast balloon experiment should be considered a very good candidate. We also recommend continuing the distribution of the falcon tube gift. Although this gift did not produce the highest level of dialogue or interest, it had a high overall average experience. Combined with its very minimal cost, it is extremely cost-effective. In fact, based on current data, it is the most cost-effective gift. Furthermore, we recommend continuing providing agar plate gifts at the festival. These gifts are very fascinating and provide children with the opportunity to see microbial biotechnology firsthand. They are arguably the most relevant to the goals of the miwelt project and as such should continue to be used. However, they should be optimized in the ways discussed above, and their significant cost should be balanced out through the use of larger quantities of cheaper gifts, such as the falcon tubes.

An additional suggestion to attract more people at the Hochschulspektakel is to have a centralized, stationary location in addition to the roaming gift box. This was a method employed

by the chemistry department at the festival, and it makes it simpler to find and engage the target demographic; instead of traveling around and looking, the target demographic finds you. However, in conjunction with the roaming gift box, this method could work even better. By engaging the children initially when they are roaming about, miwelt members could spark their interest and then guide them to the centralized location, where there could be more gifts or displays describing microbial biotechnology. This would serve to increase interest and dialogue even further. A centralized location would also help in spreading awareness about the miwelt project. This would not only benefit the project in its goals of spreading information about microbial biotechnology, but also increase the public's awareness of the project, leading to a larger pool of potential donors for future crowdfunding campaigns.

Lastly, we recommend that the miwelt project place an advertisement into the itinerary pamphlets that are distributed by ZHAW prior to the festival. This advertisement does not need to be large or fancy, but merely needs to indicate that the miwelt project is present at the festival. Although requesting this advertisement may require some financial investment, spreading awareness of the miwelt project would be very beneficial, as it is likely to attract more of the miwelt project's target demographic, as well as attract the attention of potential crowdfunders.

## 5.2 Cutting Costs

In order to increase the effectiveness of any potentially funding source, we suggest that the miwelt project optimize spending where possible. In this section, we will outline a few suggestions we have for optimizing the miwelt projects operating costs. As described previously, we recommend that the agar plate production/acquisition for the Hochschulspektakel be optimized. While the agar plates were very effective in piquing students' interest and are a fantastic example of microbial biotechnology, the labor and material costs that go into it make it

an extremely cost-ineffective gift. The previous section outlines specific optimization suggestions.

A significant portion of the miwelt project's operating costs is labor. Even with a significant amount of volunteering from miwelt team members, labor costs are still extremely high. As such, we recommend that the miwelt project make more use of students or traditional volunteers for preparation and execution of miwelt activities. Individuals at the "student" level of pay cost significantly less per hour than any other level of pay. As such, even if they are moderately less efficient with their time, less money is spent overall. Opening the miwelt project up to more traditional volunteers would allow for certain labor costs to be essentially eliminated. It is recommended that one paid miwelt member supervise any volunteers to focus their efforts and ensure that all objectives are met. However, the addition of this supervisor would still equate to less labor cost overall. Even if volunteers are provided with a small stipend for their help, labor costs are likely to be lower than their current levels.

One area in which labor costs were high was the creation of announcements and information sheets for day events such as the Hochschulspektakel and the SCNAT Jubilee. We recommend that these documents be changed as little as possible for subsequent events in order to minimize the labor cost that went into them. If the documents require significant changes, we suggest that the next iteration be made as generic as possible in order to minimize future labor costs.

Finally, we suggest that the primary distribution method of the comic book and other pamphlets be digital distribution. A significant amount of material cost goes into the printing and shipping of the physical versions of these documents. While it can be very helpful to distribute these physical versions at day events, distributing them electronically is virtually free and allows major print jobs to be done less frequently.

## 5.3 Foundations

Foundations can be an extremely lucrative source of funding for the miwelt project. Two in particular stood out to us due to their alignment with the miwelt project's goals: Science et Cité and the H.D. Wright Foundation. We recommend that the miwelt project attempt to join forces with Science et Cité and specifically the Swiss Life Sciences project as a way of financing the classroom outreach programs planned by the miwelt project. As there is already an existing relationship between ZHAW and Science et Cité, developing an extended partnership is certainly within the realm of possibility.

The H.D. Wright Foundation aims to further the advancement of science and science education. As such, we feel the H.D. Wright Foundation would be willing to provide some amount of funding to the miwelt project to engage in its goal of improving science education. It should be noted that the H.D. Wright Foundation is primarily focused on projects in Geneva, Switzerland. However, it has stated that it is willing to fund projects outside this region as long as the purpose of these projects align with the goals of the foundation. We recommend that the miwelt project work to secure funding from both of these foundations as there is a significant amount of revenue that can be secured and acceptance appears to be very likely. We also suggest that miwelt project members continue research into other foundations as this list is by no means exhaustive.

## 5.4 Corporate Sponsorship

We recommend that the miwelt project attempt to secure corporate sponsorship as a source of funding. From our analysis of the survey distributed to the academic community of ZHAW: Campus Grüental, there is a general acceptance of corporate sponsorship for educational outreach programs. Thus, the community of ZHAW: Campus Grüental revealed a lack of stigma surrounding corporate sponsorship as a whole, and as such, the miwelt project can pursue corporate sponsorship without fear of it impeding their goals. In addition, we suggest

that they survey the general public about corporate sponsorship to account for other subsets of the Swiss public.

Corporate sponsorship has shown to be a successful method of funding. BiOutils has used corporate sponsorship successfully since 2007, and thus indicates it as an appropriate method for funding an educational outreach program. The KGF is an organization backed by corporate sponsors such as Novartis, Roche, and Syngenta that acts to facilitate the interaction between a project seeking funding and the companies. We recommend that the miwelt project reach out to the KGF in order to be best matched to corporations who will not only provide a lucrative source of income, but will respect the mission of the miwelt project.

## 5.5 E-book

We recommend that the miwelt project reformat their comic book to an e-book and upload it to the Amazon Kindle Store. As there is already an electronic version of the comic book in PDF form, the conversion cost is extremely cheap. Distributing it electronically would allow it reach primary school students all over Switzerland, not just those in the Wädenswil area. The Amazon Kindle Store is an effective platform for distributing the e-book as the Amazon Kindle application is accessible on a wide variety of platforms. It is available on both Android and iOS devices, as well as all Amazon e-readers. The platform is also extremely popular due to it being free to access. As such, using the Amazon Kindle Store would allow the miwelt project to reach a large number of people.

We recommend that the first chapter of the e-book be uploaded for free, regardless of what is done with the rest of the chapters. This allows anyone to have access to it and provides the opportunity for users to get invested in the series. If they find they enjoy it, there is a high likelihood they will download the next entries. Due to this fact, we suggest that the subsequent chapters of the comic book be sold. This would allow the miwelt project to recuperate the conversion cost of the e-book and would provide a constant, albeit small, source of income. This

income could then be used to fund further activities of the miwelt project or could be reinvested in the development of the comic book.

As demonstrated by Brigitte Brocato, marketing is not vital to the success of an e-book. However, we do recommend that miwelt project members partake in some advertising and distribution endeavors. We recommend that QR codes and small advertisements for the comic book be distributed at events such as the Hochschulspektakel and downloading of the comic book be encouraged. This makes it extremely easy for parents and children to access the e-book, even without knowing of its existence. We also suggest using social media to spread knowledge of its existence. This provides a free source of advertising as its existence will be spread word-of-mouth and has the potential to reach an extremely wide audience. It should be noted that if the development or conversion of the comic book is crowdfunded, the very nature of the crowdfunding campaign serves to help market the e-book. If additional funding can be secured, more traditional marketing approaches may become viable.

## 5.6 Crowdfunding

As stated in our analysis, we feel that the miwelt project could secure a significant amount of revenue through crowdfunding. The two main activities the miwelt project should crowdfund are the Hochschulspektakel and the development and e-book conversion of the comic book. This is due to a combination of their relatively low costs and the success of similar projects in the past. For each activity we will now provide our recommendations for how to structure the story of the crowdfunding campaign, what rewards to give backers, what crowdfunding platform to use, and how much we estimate the campaign will receive.

### 5.6a Hochschulspektakel

**Story:** The main goal of this story is to provide some background on the miwelt project and the Hochschulspektakel as well as to show off the success of the miwelt project's activities

the previous year. We recommend that an introductory video be created for the project as it provides opportunities to show off particular team members. This video should follow and be narrated by Melanie Ottinger due to her heavy involvement with the Hochschulspektakel. In it, Melanie should describe what the miwelt project is, emphasizing that it aims to teach primary school students about the “invisible world of microbes.” Melanie should then briefly introduce different members of the miwelt team, having them show passion for the project. Melanie should then introduce the Hochschulspektakel as an outreach event from ZHAW to the public that is meant to show off many interesting facets of the university. She should then show off pictures and videos from the previous Hochschulspektakel including showing and explaining what the miwelt project members did previously and what they intend to do this year. She should explain how much kids enjoyed it the previous year. Finally, Melanie should say that the plan is in place for attending again this year, but they need funding for material costs. She should implore the community to help this event be realized. This will conclude the video. We also recommend that the video be supplemented with text that reiterates points made in the video and includes additional pictures from previous Hochschulspektakel.

**Rewards:** The following table is an example of rewards that can be offered for backers of the Hochschulspektakel. It includes the pledge amount, the reward description the backers will see, and the actual reward to deliver.

Pledge	Description	Reward
CHF 15	Come to the Hochschulspektakel and we'll give you vouchers for free food or a free drink (your choice).	1 Food or 1 Drink voucher for the Hochschulspektakel.
CHF 25	The above rewards AND we'll write your name on a special thank-you section of our gift	All above rewards AND their name will be added to a list of backers on one side of the



	box.	gift box.
CHF 40	The above rewards AND we'll give you a personalized gift at the Hochschulspektakel.	All above rewards AND an agar plate gift with "Thank you, <backer name>!" and a " : )" painted on it. <backer name> should be replaced with the backers name.
CHF 50	The above rewards AND come meet us at the festival and we'll give you a hug and tell everyone that you're amazing for helping make this event happen.	All above rewards AND a hug from the miwelt project members attending the event AND miwelt project members will shout out a thank you to the backer.
CHF 75	The above rewards AND join us for dinner and drinks after the Hochschulspektakel (we'll pay)!	All above rewards AND an invitation to have dinner with miwelt project members at the festival after gift giving closes (Note: miwelt will pay for dinner and 1 drink).
CHF 200	Wow you're amazing! The above rewards AND you can join our gift giving during the festival!	All above rewards AND the backer can hold the hawker's tray that has additional materials on it (i.e. not the gift box tray). Note: limit this to 1 maximum claim.

**Platform & Goal:** We recommend using Indiegogo as the crowdfunding platform due to its success in funding small, local events in the past and due to receiving everything that is pledged rather than only receiving funding if the entirety of the event is funded. We recommend the target goal be set to CHF 550 as this is the cost of the Hochschulspektakel plus an amount that will cover the fees Indiegogo will take once funding is complete.

## 5.6b Comic Book

**Story:** The main goal of this story is to explain the miwelt project and how it is trying to use an electronic book spread its outreach to all of Switzerland instead of just Wädenswil. We again recommend using an introductory video for similar reasons outlined above. In this case, we recommend the video follow and be narrated by Karin Kovar, Vernea Looser, or Melanie Ottinger due to their administrative position in the project. The narrator should describe what the miwelt project is, emphasizing that it aims to teach primary school students about the “invisible world of microbes.” They should then briefly introduce different members of the miwelt team, having them show passion for the project. When introducing them, the members should be shown preparing for local events and the narrator should discuss how until now, most of the miwelt project’s activities have been localized to the Wädenswil area, in part due to how small and volunteer-focused the team is. The narrators should then say that they have started creating an electronic comic book in the hopes of using it to reach primary school students all across Switzerland. The video should then show some panels of the comic and the narrator should explain that the story and concept behind it are complete and they have secured an amazing author and a well known illustrator to help create the comic book. The narrator should then state that they still need money to fund the actual development and publishing of the comic book. It is at this point that they should implore the public for help in extending knowledge of microbial biology to everywhere in Switzerland. We again recommend that supplemental text be used to enhance points made in the video and show off some more panels of the comic book.

**Rewards:** The following table is an example of rewards that can be offered for backers of the comic book. It includes the pledge amount, the reward description the backers will see, and the actual reward to deliver.

Pledge	Description	Reward
CHF 15	A printout of the comic book mailed to you when it is complete.	One physical copy of the comic book mailed to the backer.
CHF 25	A signed copy of the comic book with a personal thank you note from the miwelt team mailed to you when it is complete.	One physical copy of the comic book with a personalized thank you note ("Thank you, <backername>!" where <backername> is the name of the backer) signed by Dr. Karin Kovar and Melanie Ottinger mailed to the backer.
CHF 50	The above reward AND your name in a special thank you section at the front of the comic book.	Above reward AND have the backers name added to a thank you page (listing all backers of this level) at the front of the comic book
CHF 100	The above rewards AND a 30 minute phone call with a member of the miwelt project to talk about anything you want!	Above rewards AND a 30 minute phone call with a member of the miwelt project (at a time that works for both parties).
CHF 500	The above rewards AND a cameo in the next chapter of the comic book!	Above rewards AND the miwelt team and author will work to include a cameo (if only in name) of the backer. Note: this reward should be limited at the team and authors discretion.

**Platform & Goal:** We recommend using Indiegogo as the crowdfunding platform due to its success in funding the development of books in the past and due to receiving everything that is pledged rather than only receiving funding if the entirety of the event is funded. We recommend the target goal be set to CHF 10,000 as this will fund the development of the comic

book for one year, cover the fees Indiegogo takes, and provide enough revenue to convert the comic book to an e-book and market its existence.

### 5.6c Other Activities

While we do not have specific guidelines for other activities, we do suggest that the miwelt project crowdfund the majority of their activities and costs. For day events other than the Hochschulspektakel, between CHF 1,000 and CHF 2,000 can be secured through crowdfunding, however, if the event is private, less funding can be expected. For most day events, we suggest using Indiegogo due to its history of funding events and its “keep what you get” funding model. If revenue is needed for salaries of miwelt project members, we recommend using StartSomeGood as a platform to secure it. However, it is unlikely that a significant amount of revenue can be secured from this platform due to the relatively localized nature of the miwelt project.

## 5.7 Final Conclusions

Currently, Switzerland is enthusiastic and accepting of educational programs, especially considering that Switzerland is a world leader in education. We have found not only a general acceptance of the miwelt project, but a niche for it as well. The opinions in the survey distributed to the academic community of ZHAW: Campus Grüental show an agreement that both the quantity and quality of microbial biotechnology education have room for improvement in Swiss primary schools. The miwelt project ascertains the goal of improving a dialogue about microbial biotechnology amongst students between the ages of seven and eleven, and as such, aids in increasing microbial biotechnology education in Swiss primary schools.

From our observations made at the Hochschulspektakel, we found the festival to be inexpensive relative to the other events of the miwelt project and thus we feel it should be continued. Through analysis that we made, the Hochschulspektakel resulted in an overall

positive experience for the people who interacted with the members of the miwelt project. Critically, the Hochschulspektakel was successful in promoting a dialogue about microbial biotechnology with the miwelt project's target group. Due to the success of the Hochschulspektakel and the fact that it maintained the overall goals of the miwelt project, it should remain as a substantial component to the project.

In order to continue the miwelt project, alternative funding must be secured before the expiration of its government grants. There are many viable methods which we found to be potentially successful, and by utilizing them in tandem, we believe they can provide enough revenue to sustain the miwelt project into the future. The most traditional methods for funding educational outreach projects are foundations and corporations. We recommend that the miwelt project partner with Science et Cité and apply to grants from the H.D. Wright Foundation. Foundations provide a reliable source of income and are the easiest to reach out to. Next, we recommend securing corporate sponsorship. The KGF is a great resource for partnering with corporations who align with the miwelt project's objectives. In addition to foundations and corporations, we recommend crowdfunding and an e-book as supplemental methods of funding the project. While currently non-traditional for Switzerland, they have demonstrated a high potential for providing funding as well as increasing the audience of the miwelt project.

The miwelt project has successfully filled a niche in Switzerland and demonstrated the success of its methods for achieving its goals. There is apparent room to increase microbial biotechnology education in Switzerland and the miwelt project has shown itself to be effective at doing so. By utilizing the aforementioned funding methods and employing our other recommendations, the miwelt project has the potential to continue operating for years to come.

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s-On+Activities+for+Ages+4-8](http://www.amazon.com/Curious-Kids-Science-Book-Hands-<br/>/dp/1943147000/ref=sr_1_1?ie=UTF8&qid=1444644293&sr=8-<br/>1&keywords=The+Curious+Kid%E2%80%99s+Science+Book%3A+100%2B+Creative+Hand<br/>s-On+Activities+for+Ages+4-8)
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# Appendix

Distribution of Gifts Handed Out at the Hochschulspektakel

Gifts Distributed	
Gift Type	Number
Vial Box	1
Falcon Tube	17
Yeast Balloon Experiment	11
Microbe Booklet	11
Agar Plate	12
Lab Gloves	11
Comic	8
<b>Total Gifts Distributed</b>	<b>71</b>

Figure 11 - Gifts Distributed at the Hochschulspektakel

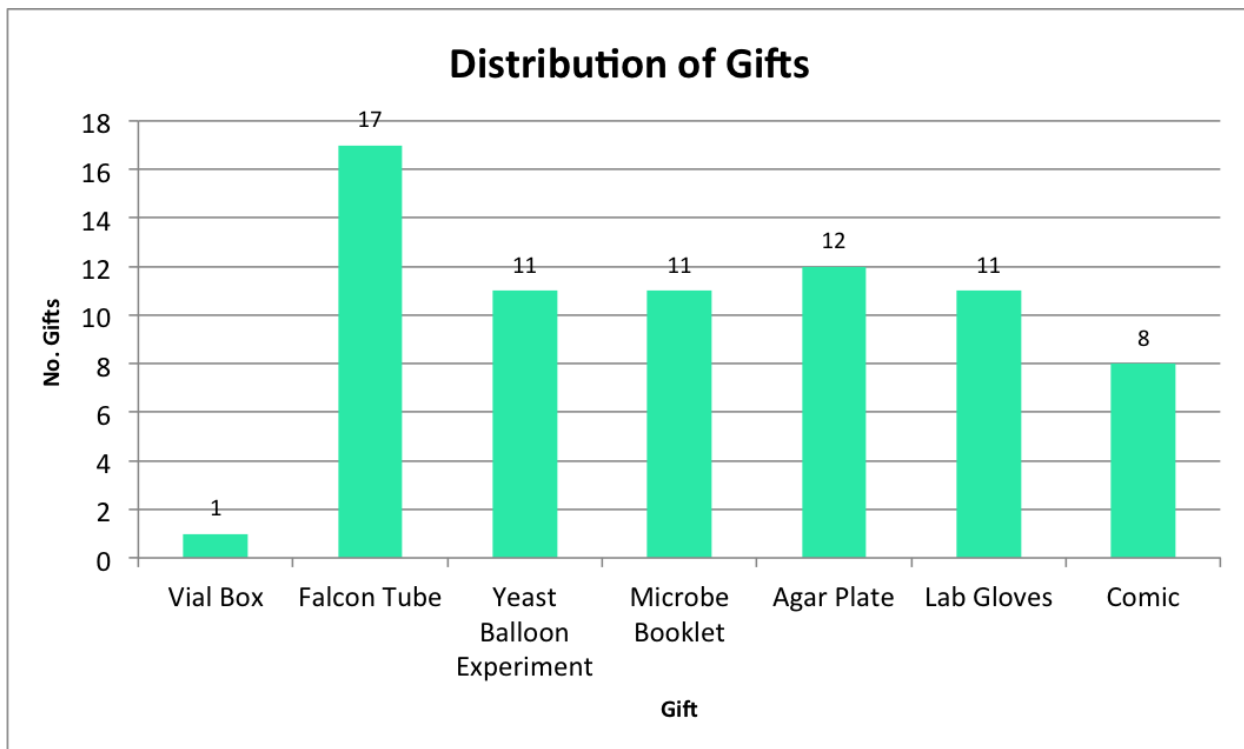


Figure 12 - Visualization of Gifts Distributed at the Hochschulspektakel

### Breakdown of Experiences at the Hochschulspektakel

Overall Experience Overview	
Experience	Number
Bad	1
Okay	12
Good	27
Great	13
<b>Average Experience</b>	Good

Figure 13 - Distribution of Experiences of Engaged Parties at the Hochschulspektakel

### Breakdown of Demographics Engaged at the Hochschulspektakel

Demographics Distribution	
Category	Number
Child	36
Young Adult	4
Adult	13
Family	0
Other	0
<b>Total People Engaged</b>	53

Figure 14 - Distribution of Demographics Engaged at the Hochschulspektakel

### Breakdown of Facial Expressions at the Hochschulspektakel

Facial Expressions Distribution	
Facial Expression	Number
Smile	41
Neutral	12
Frown	0

Figure 15 - Distribution of Facial Expressions of Engaged Parties at the Hochschulspektakel

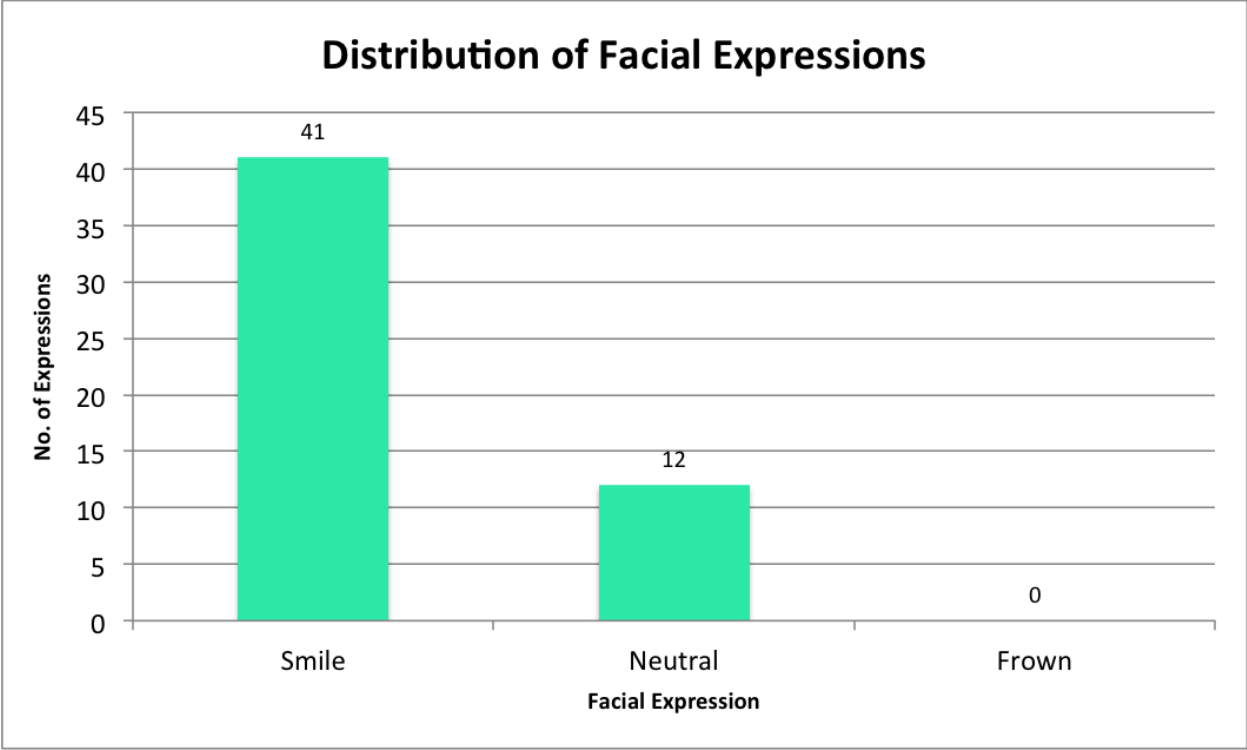


Figure 16 - Visualization of Distribution of Facial Expressions at the Hochschulspektakel

**Breakdown of Dialogue Levels at the Hochschulspektakel**

Dialogue Level Distribution	
Level	Number
None	1
Minimal	19
Engaged	27
Enthusiastic	5

Figure 17 - Distribution of Dialogue Levels of Engaged Parties at the Hochschulspektakel

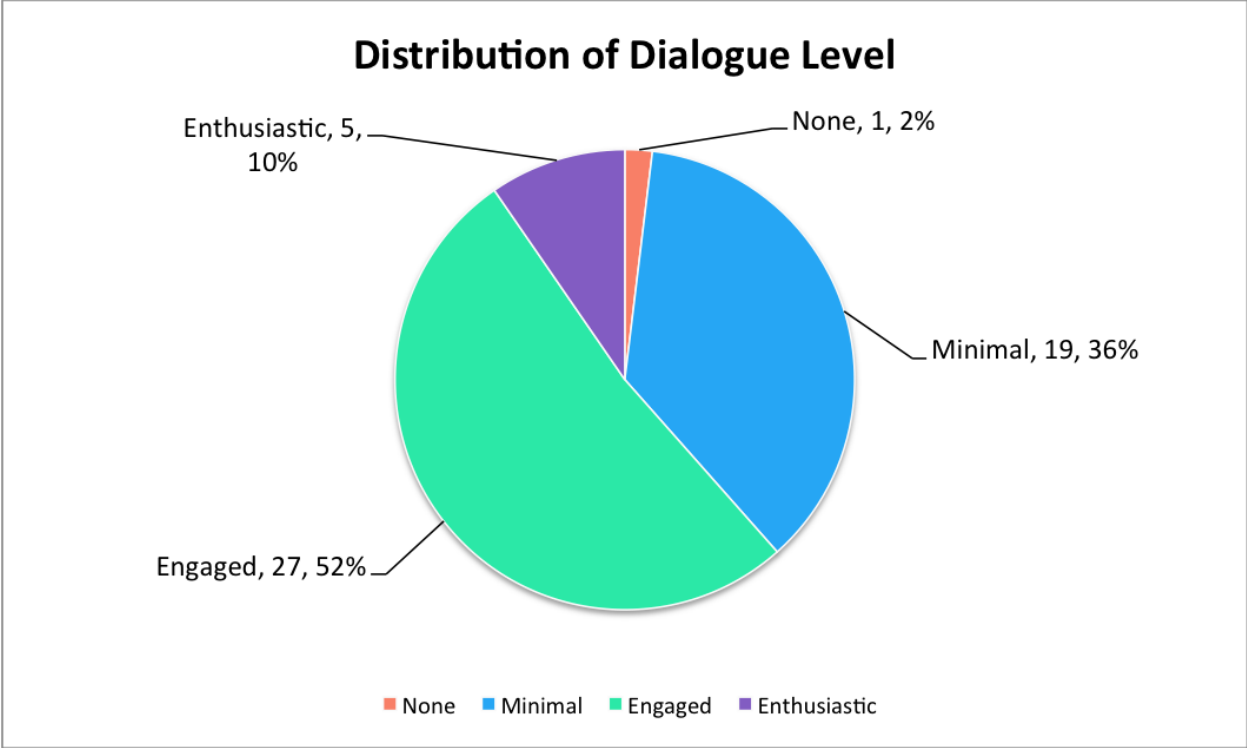


Figure 18 - Visualization of Distribution of Dialogue Levels at the Hochschulspektakel

### Breakdown of Interest Levels at the Hochschulspektakel

Interest Level Distribution	
Level	Number
None	2
Low	12
Medium	21
High	17

Figure 19 - Distribution of Interest Levels of Engaged Parties at the Hochschulspektakel

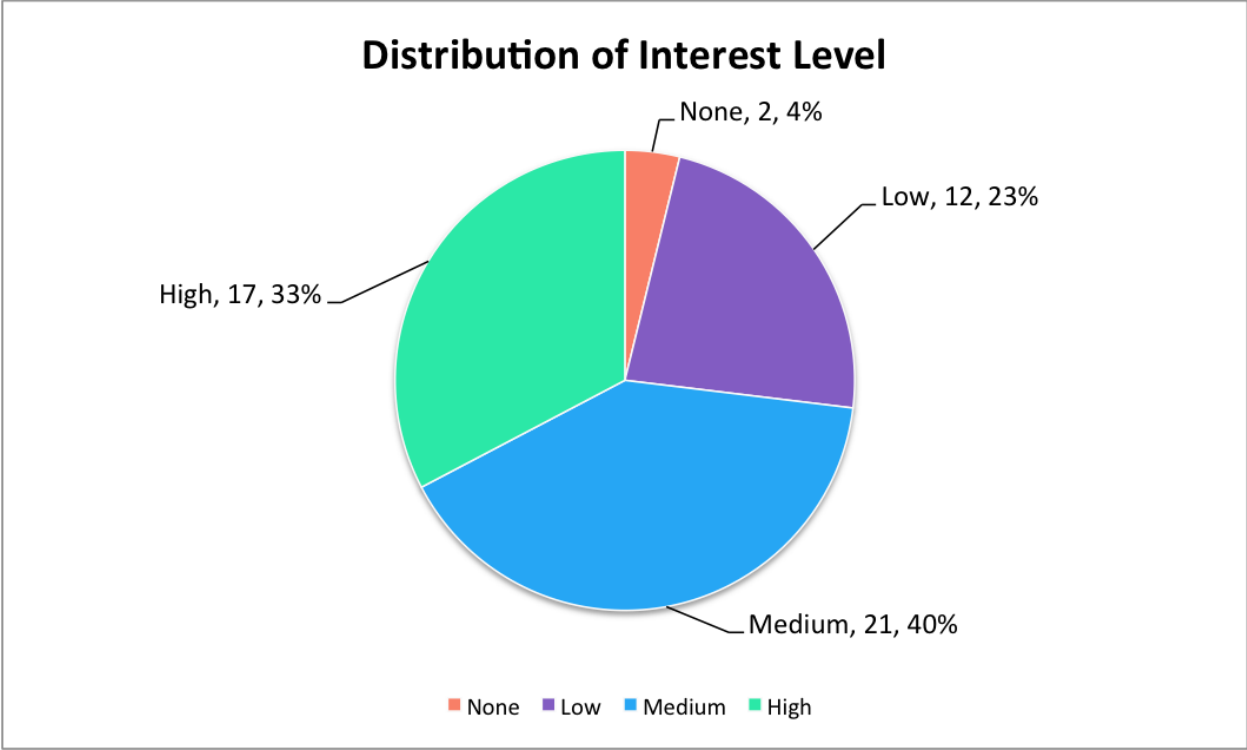


Figure 20 - Visualization of Distribution of Interest Levels at the Hochschulspektakel

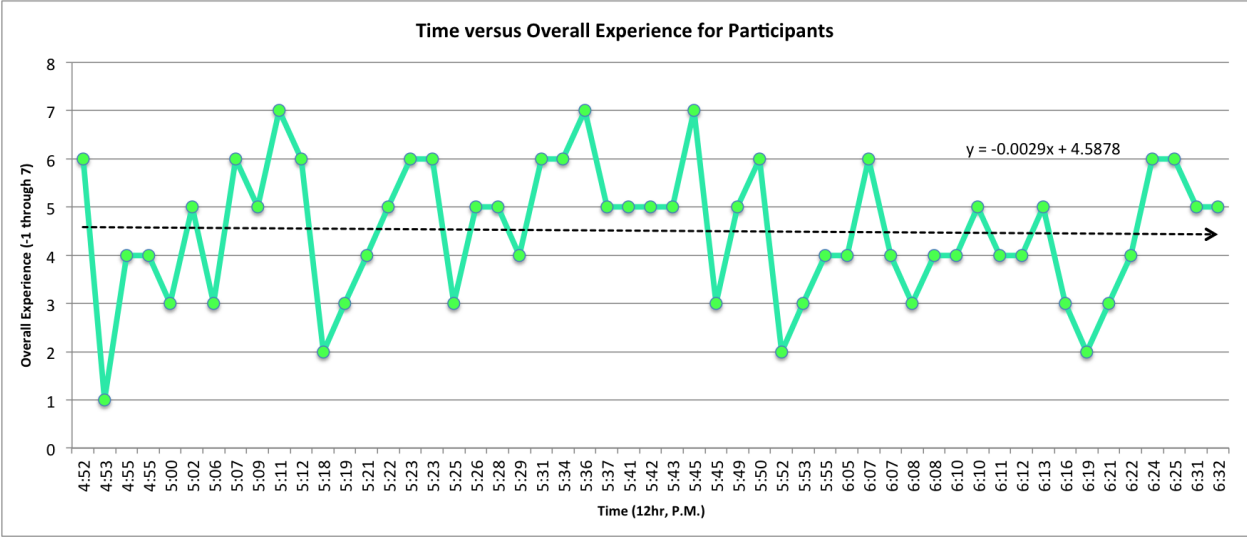


Figure 21 - Visualization of Overall Experience of Engaged Parties Over Time at the Hochschulspektakel



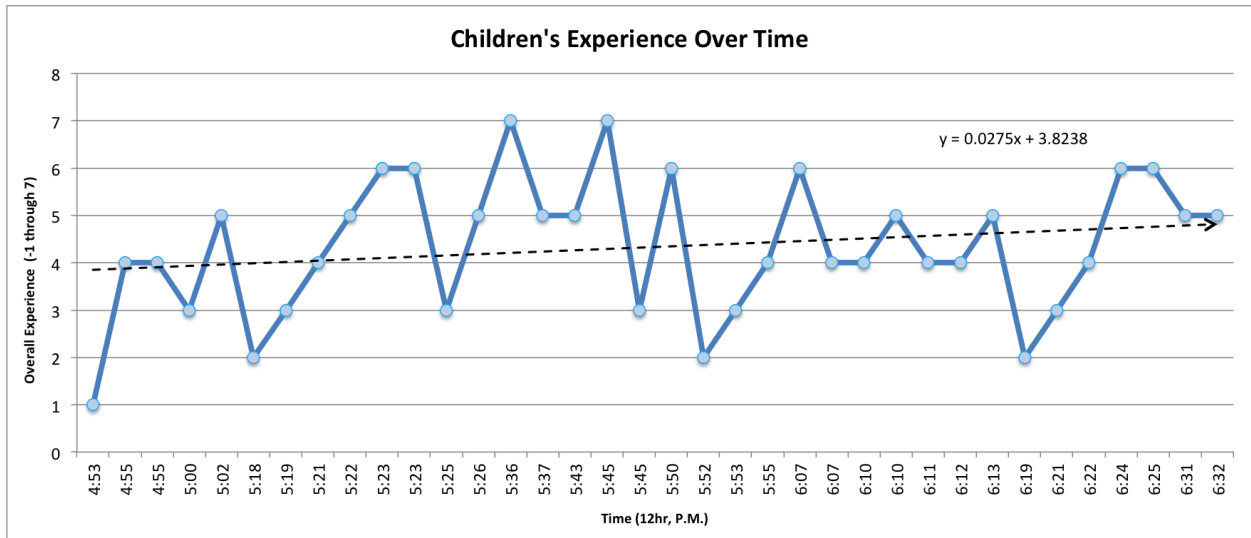


Figure 22 - Visualization of Children's Overall Experience Over Time at the Hochschulspektakel

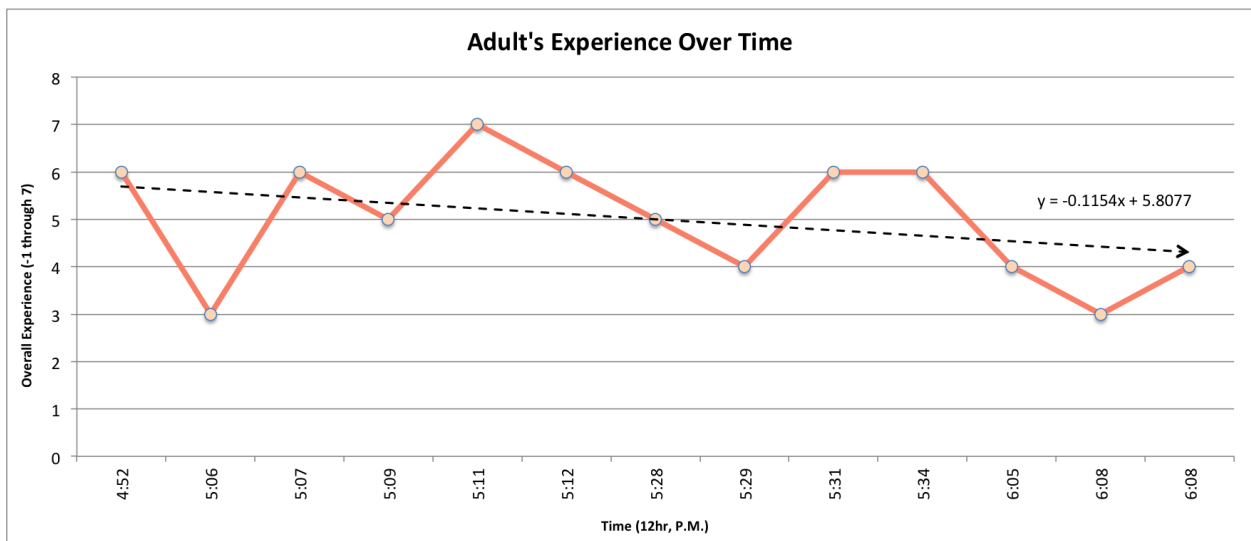


Figure 23 - Visualization of Adult's Experience Over Time at the Hochschulspektakel

### Breakdown of Experiences Given Microbial Booklet Gift

Microbial Booklet	
Experience	Amount
-1	0
0	0
1	1
2	1
3	0
4	4
5	3
6	4
7	1

Figure 24 - Distribution of Experiences Given Microbial Booklet Gift

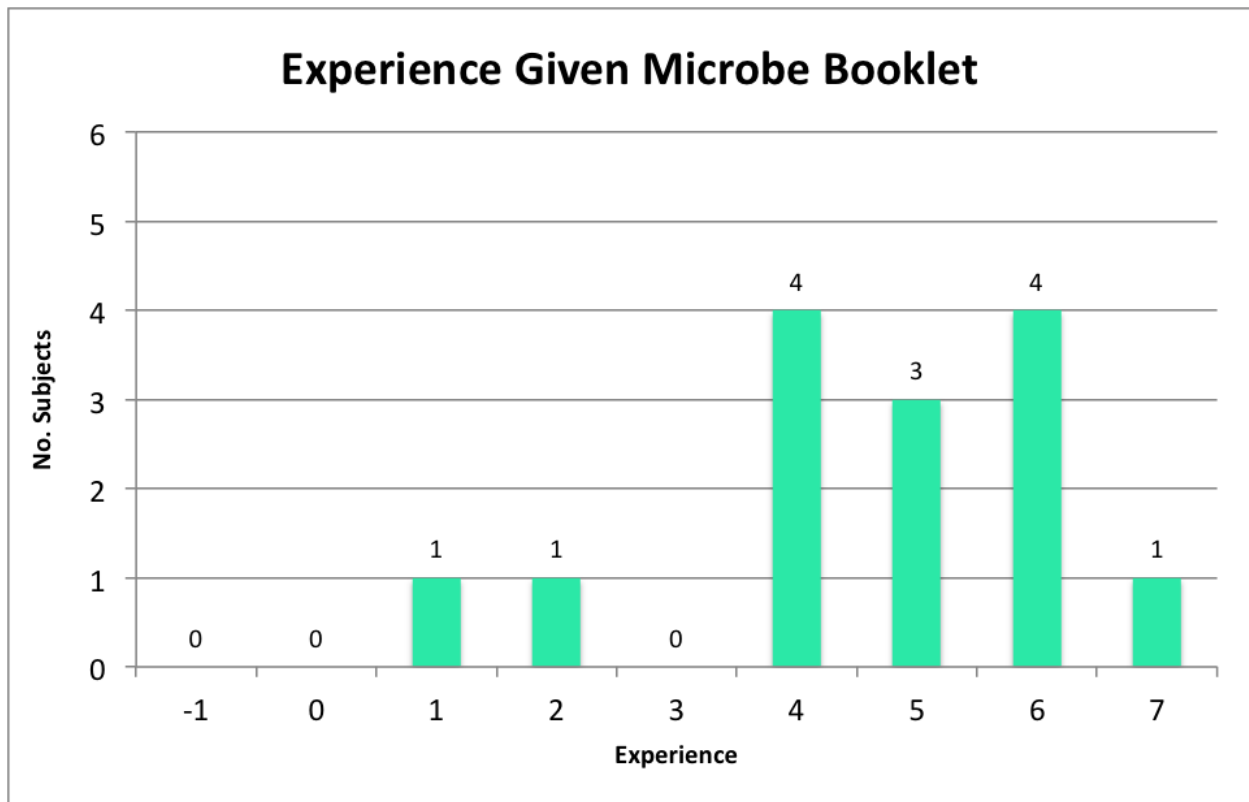


Figure 25 - Visualization of Distribution of Experiences Given Microbial Booklet Gift

**Breakdown of Experiences Given Falcon Tube Gift**

Falcon Tube	
Experience	Amount
-1	0
0	0
1	0
2	1
3	3
4	4
5	5
6	4
7	0

Figure 26 - Distribution of Experiences Given Falcon Tube Gift

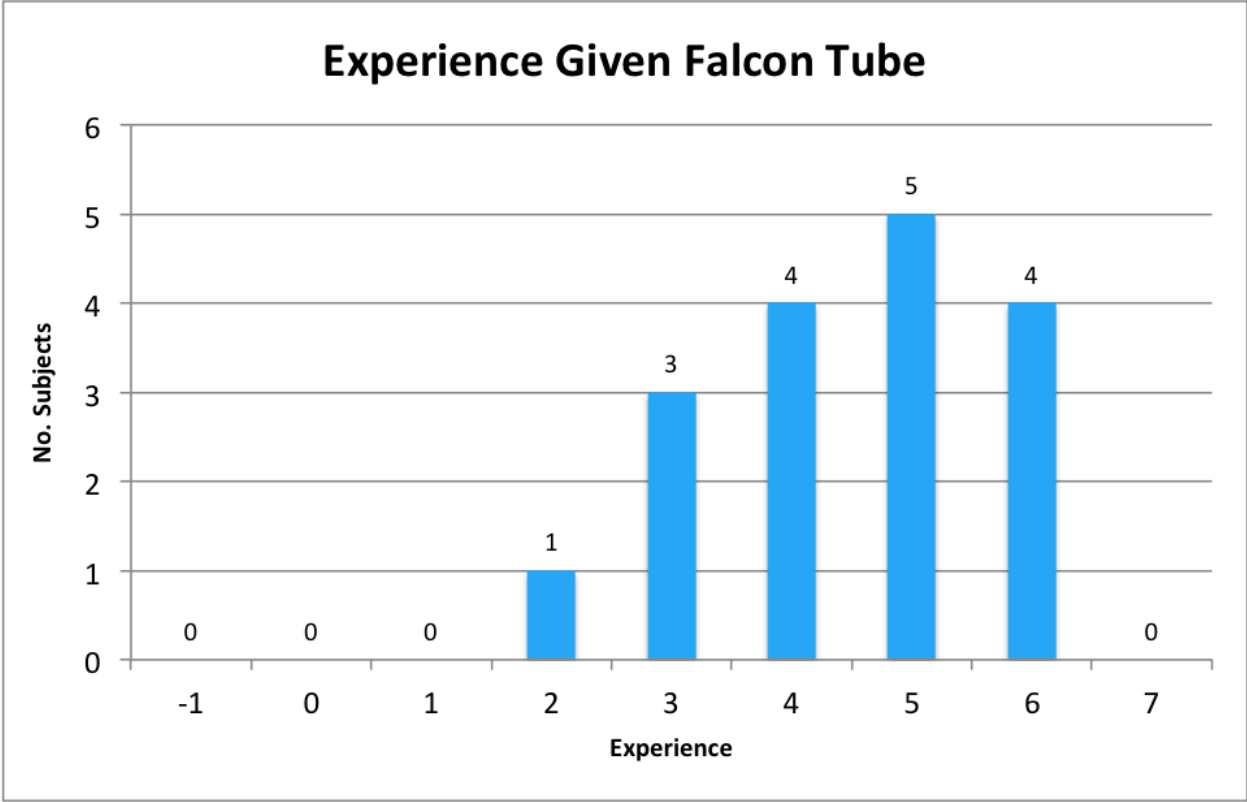


Figure 27 - Visualization of Distribution of Experiences Given Falcon Tube Gift

### Breakdown of Experiences Given Agar Plate Gift

Agar Plate	
Experience	Amount
-1	0
0	0
1	0
2	0
3	3
4	2
5	3
6	4
7	0

Figure 28 - Distribution of Experiences Given Agar Plate Gift

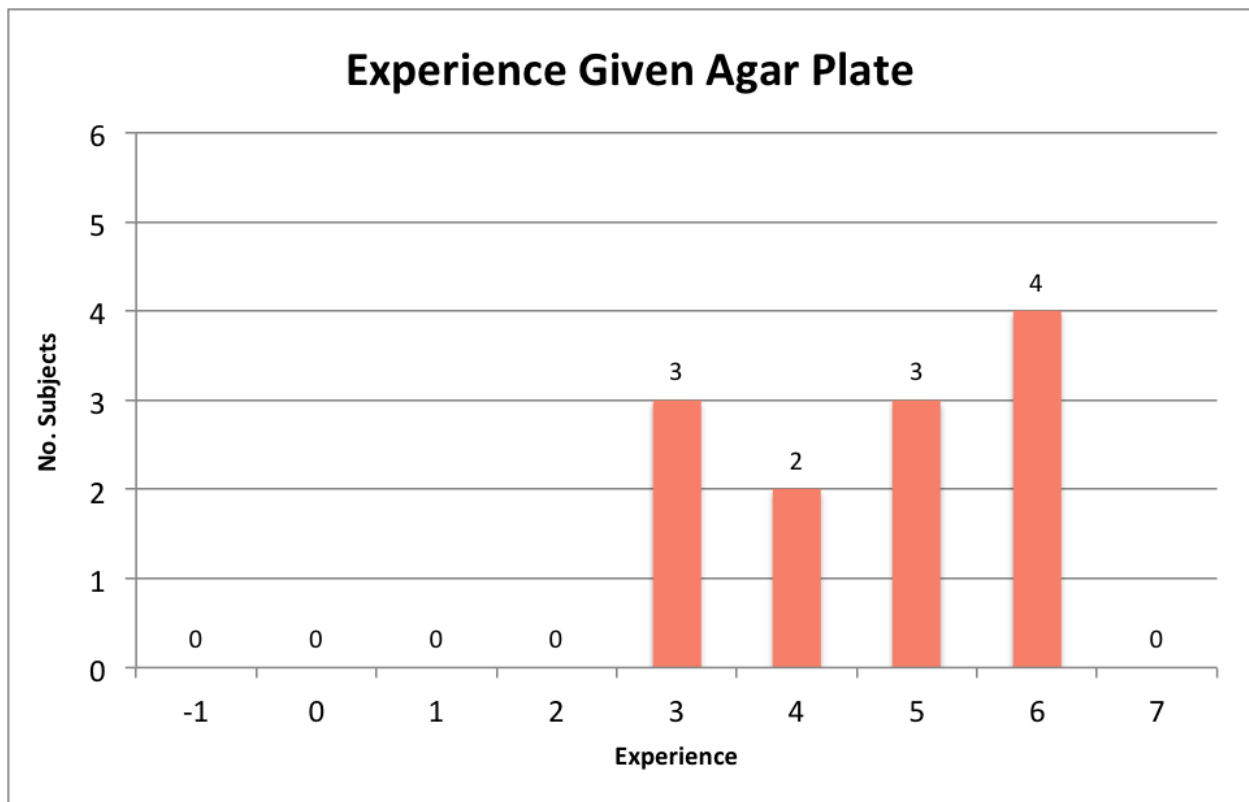


Figure 29 - Visualization of Distribution of Experiences Given Agar Plate Gift

### Breakdown of Experiences Given Lab Glove Gift

Lab Gloves	
Experience	Amount
-1	0
0	0
1	0
2	2
3	3
4	1
5	3
6	1
7	2

Figure 30 - Distribution of Experiences Given Lab Glove Gift

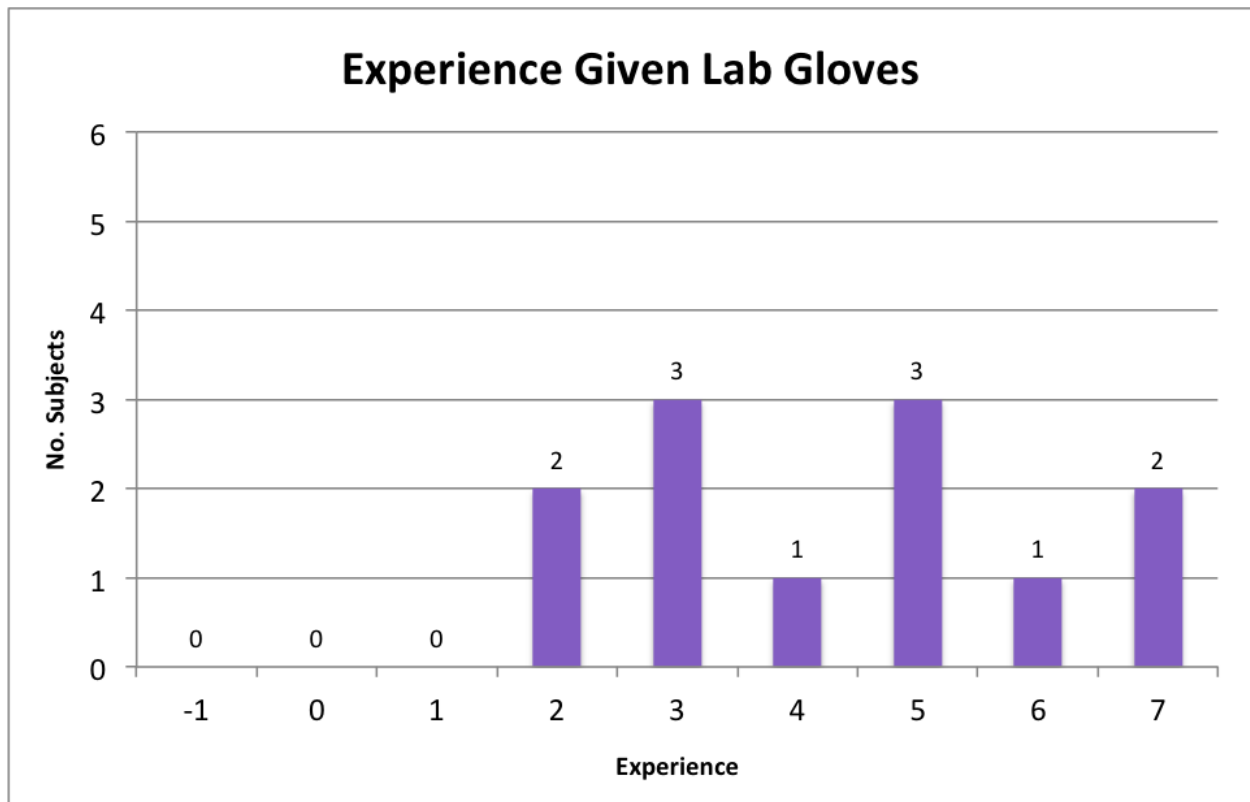


Figure 31 - Visualization of Distribution of Experiences Given Lab Glove Gift

### Breakdown of Experiences Given Vial Box Gift

Vial Box	
Experience	Amount
-1	0
0	0
1	0
2	0
3	1
4	0
5	0
6	0
7	0

Figure 32 - Distribution of Experiences Given Vial Box Gift



Figure 33 - Visualization of Distribution of Experiences Given Vial Box Gift

**Breakdown of Experiences Given Comic Book Gift**

Comic	
Experience	Amount
-1	0
0	0
1	0
2	0
3	0
4	2
5	3
6	1
7	2

Figure 34 - Distribution of Experiences Given Comic Book Gift

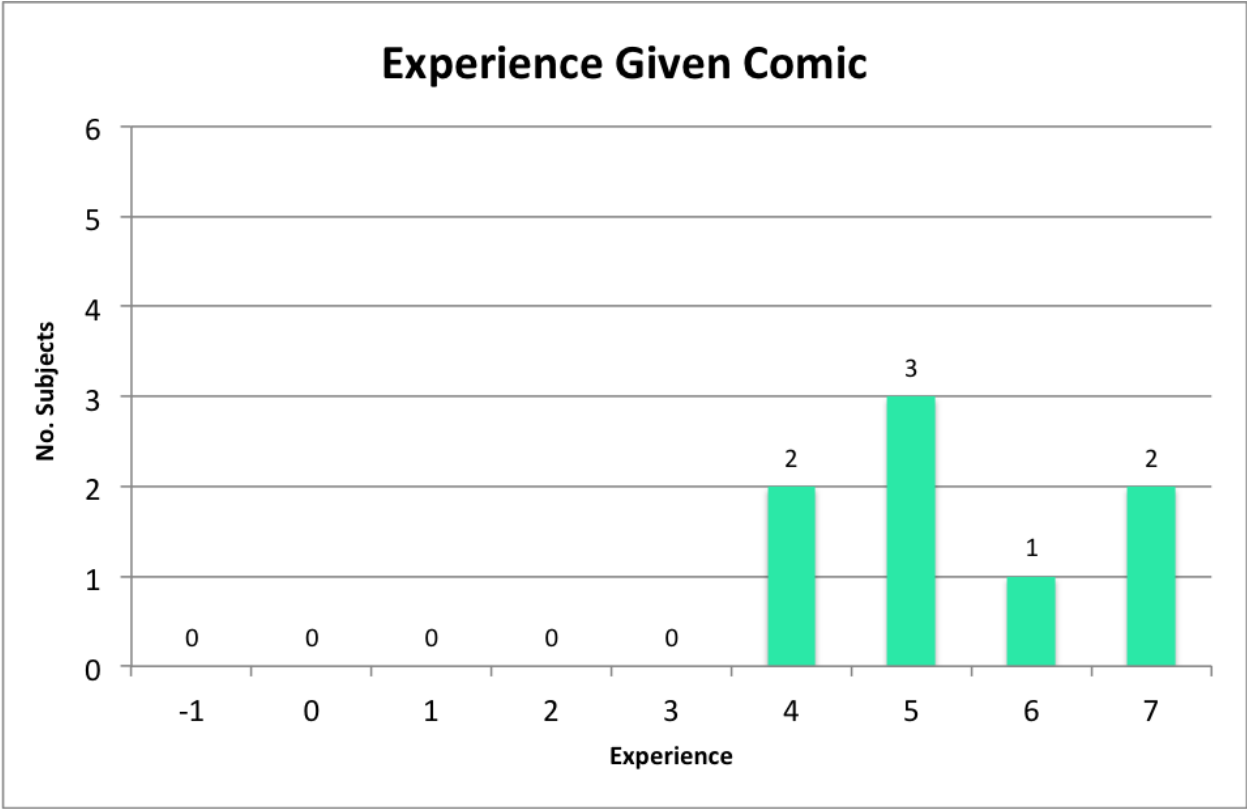


Figure 35 - Visualization of Distribution of Experiences Given Comic Book Gift

**Breakdown of Experiences Given Yeast Balloon Experiment Gift**

Yeast Balloon Experiment	
Experience	Amount
-1	0
0	0
1	0
2	0
3	0
4	1
5	5
6	4
7	1

Figure 36 - Distribution of Experiences Given Yeast Balloon Experiment Gift

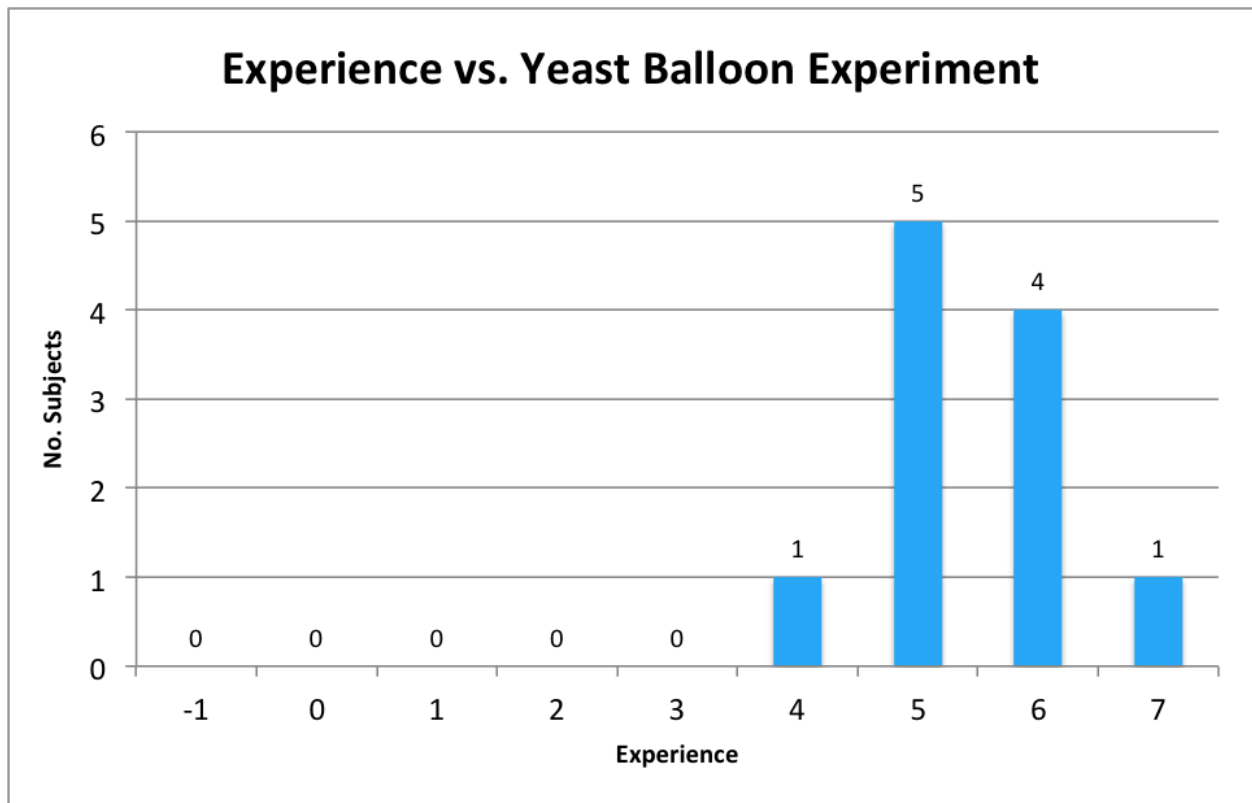


Figure 37 - Visualization of Distribution of Experiences Given Yeast Balloon Experiment Gift



### Breakdown of Experiences Given One Gift

One Gift	
Experience	Amount
-1	0
0	0
1	1
2	2
3	8
4	10
5	8
6	6
7	1

Figure 38 - Distribution of Experiences Given One Gift



Figure 39 - Visualization of Distribution of Experiences Given One Gift

**Breakdown of Experiences Given Two Gifts**

Two Gifts	
Experience	Amount
-1	0
0	0
1	0
2	1
3	1
4	2
5	4
6	3
7	1

Figure 40 - Distribution of Experiences Given Two Gifts



Figure 41 - Visualization of Distribution of Experiences Given Two Gifts

### Breakdown of Experiences Given Three Gifts

Three Gifts	
Experience	Amount
-1	0
0	0
1	0
2	0
3	0
4	0
5	2
6	2
7	1

Figure 42 - Distribution of Experiences Given Three Gifts



Figure 43 - Visualization of Distribution of Experiences Given Three Gifts

### Breakdown of Average Experience Based on Demographic

Demographic	Average Experience
Young Adult	4.50
Child	4.33
Adult	5.00

Figure 44 - Distribution of Average Experience by Demographic

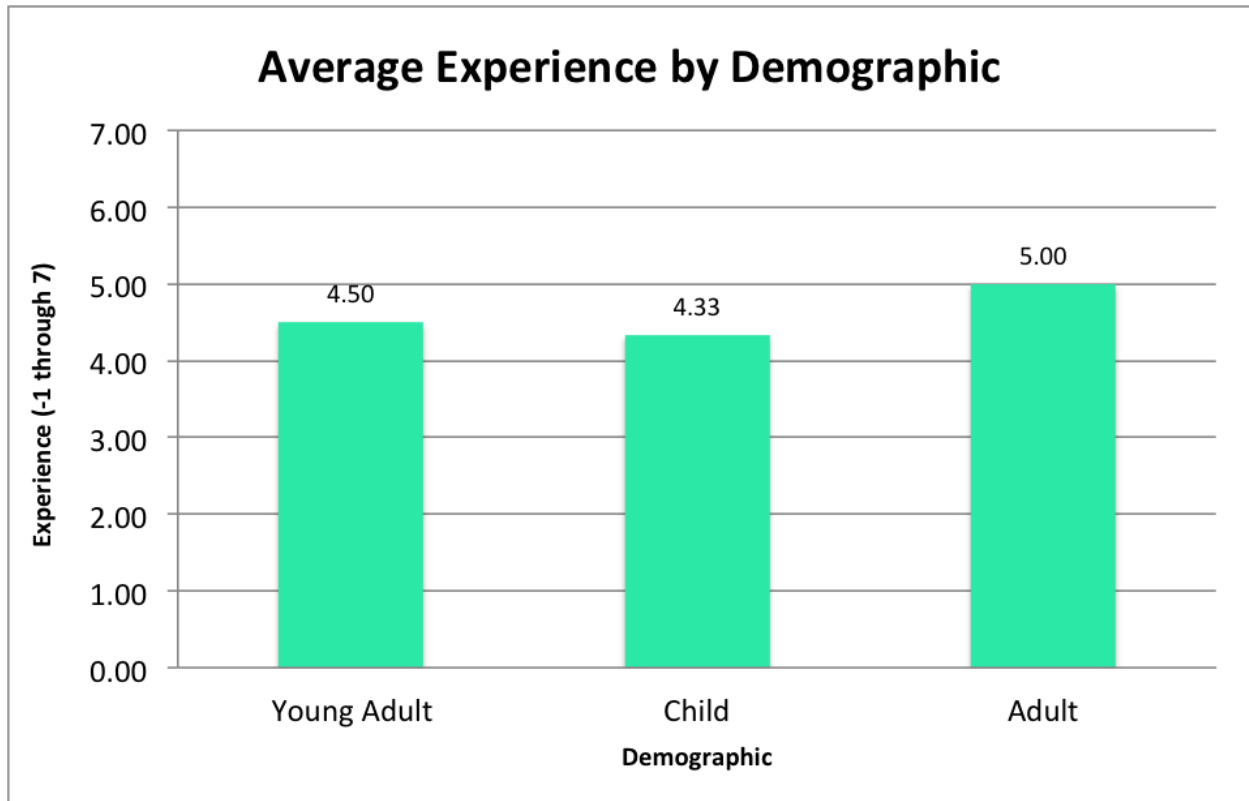


Figure 45 - Visualization of Distribution of Average Experience by Demographic

### Breakdown of Average Experience Based on Number of Gifts Received

No. Gifts	Average Experience
One	4.22
Two	4.83
Three	5.80

Figure 46 - Distribution of Average Experience by Number of Gifts

### Breakdown of Average Experience of Children Based on Gift

Gift	Average Child Experience
Microbial Booklet	4.30
Falcon Tube	4.46
Agar Plate	4.38
Lab Gloves	5.18
Vial Box	3.00
Comic	5.43
Yeast Experiment	5.44

Figure 47 - Distribution of Children's Average Experience by Gift

### Breakdown of Average Interest Level of Children Based on Gift

Gift	Average Child Interest
Microbial Booklet	1.70
Falcon Tube	2.15
Agar Plate	2.38
Lab Gloves	2.36
Vial Box	2.00
Comic	2.43
Yeast Experiment	2.56

Figure 48 - Distribution of Children's Average Interest Level by Gift

### Breakdown of Average Dialogue Level of Children Based on Gift

Gift	Average Child Dialogue
Microbial Booklet	1.80
Falcon Tube	1.54
Agar Plate	1.38
Lab Gloves	2.09
Vial Box	1.00
Comic	2.14
Yeast Experiment	2.11

Figure 49 - Distribution of Children's Average Dialogue Level by Gift

#### Cost Breakdown of Vial Box Gift\*

Vial Box: 1x	
Description	Cost (CHF)
<i>No info available</i>	

Figure 50 - Itemized Cost Breakdown of Vial Box Gift

\*Incomplete due to missing information

#### Cost Breakdown of Falcon Tube Gift

Falcon Tubes: 18x	
Description	Cost (CHF)
Pipets (18)	2.25
Falcon tubes (18)	1.39
<i>Total Cost:</i>	3.64
<i>Cost Per 1 Unit:</i>	0.20

Figure 51 - Itemized Cost Breakdown of Falcon Tube Gift

### Cost Breakdown of Microbial Booklet Gift

Microbe Booklets: 14x	
Description	Cost (CHF)
Yeast cubes (14)	3.50
Booklets (14)	12.74
<i>Total Cost:</i>	16.24
<i>Cost Per 1 Unit:</i>	1.16

Figure 52 - Itemized Cost Breakdown of Microbial Booklet Gift

### Cost Breakdown of Lab Glove Gift

Lab Gloves: 12x	
Description	Cost (CHF)
Gloves (12)	3.70
<i>Total Cost:</i>	3.70
<i>Cost Per 1 Unit:</i>	0.31

Figure 53 - Itemized Cost Breakdown of Lab Glove Gift

### Cost Breakdown of Agar Plate Gift

Agar Plates: 15x	
Description	Cost (CHF)
10g yeast extract	1.95
20g peptone	0.95
20g dextrose monohydrate	2.03
20g agar	5.04
0.25 yeast cubes	0.25
40x petri dishes	9.91
Parafilm	6.20
Vacuum filtering unit (1)	7.18
"S.cerevisiae" stickers (15)	21.75
"Keep closed" stickers (15)	
Labor (126 mins)	105.00
<i>Total Cost:</i>	160.26
<i>Cost Per 1 Unit:</i>	10.68

Figure 54 - Itemized Cost Breakdown of Agar Plate Gift

### Cost Breakdown of Yeast Balloon Experiment Gift\*

Yeast Balloon Experiment: 9x	
Description	Cost (CHF)
Balloons (9)	0.57
Booklets (9)	
<i>Total Cost:</i>	0.57
<i>Cost Per 1 Unit:</i>	0.06

Figure 55 - Itemized Cost Breakdown of Yeast Balloon Experiment Gift

**\*Incomplete due to missing information**



**Cost Breakdown of Comic Book Gift\***

Comics: 7x	
Description	Cost (CHF)
Comics (7)	
Total Cost:	0.00
Cost Per 1 Unit:	0.00

Figure 56 - Itemized Cost Breakdown of Comic Book Gift

**\*Incomplete due to missing information**

**Distribution of Cost-Effectiveness Ratios For Gifts**

Gift	Ratios		
	Experience:CHF	Interest:CHF	Dialogue:CHF
Microbial Booklets	3.71	1.47	1.55
Falcon Tubes	22.06	10.65	7.61
Agar Plates	0.41	0.22	0.13
Lab Gloves	16.81	7.67	6.78

Figure 57 - Distribution of Cost-Effectiveness Ratios for Gifts

<b>Breakdown of Festival Cost</b>		
<b>Description</b>	<b>Category</b>	<b>Cost (CHF)</b>
Vial Box Gift*	Materials	0.00
Falcon Tube Gift	Materials	3.64
Microbe Booklet Gift	Materials	16.24
Agar Plate Gift	Materials	160.26
Lab Gloves	Materials	3.70
Yeast Balloon Experiment Gift*	Materials	0.57
Comic Book Gift*	Materials	0.00
Gift Box Creation - Valentina (79 mins)	Labor	39.50
Gift Box Creation - Students (78 mins)	Labor	38.00
Box Material Gathering - Valentina (7 mins)	Labor	7.00
Festival - Melanie (120 mins)	Labor	100.00
Festival - Valentina (120 mins)	Labor	60.00
<i>Total Festival Cost:</i>		428.91
<i>Cost per Person Engaged:</i>		8.09

Figure 58 - Itemized Breakdown of Total Festival Cost

<b>Material and Labor Breakdown</b>	
<b>Category</b>	<b>Cost (CHF)</b>
Materials	184.41
Labor	244.50

Figure 59 - Categorical Breakdown of Total Festival Cost

Subject (Number)	Gift 1	Gift 2	Gift 3	Gifts Received (Number)	Time Taken (hr:min)	Demographic of Gift Receiver (Child, Young Adult, Adult, Family, Other)	Facial Expression (Smile, Neutral, Frown)	Dialogue Level (None, Minimal, Engaged, Enthusiastic)	Interest Level (None, Low, Medium, High)
1	MB			1	4:52	Adult	Smile	Engaged	High
2	MB			1	4:53	Child	Neutral	Minimal	None
3	MB			1	4:55	Child	Smile	Minimal	Medium
4	FT			1	4:55	Child	Smile	Engaged	Low
5	AP	LG		2	5:00	Child	Neutral	Minimal	Medium
6	FT			1	5:02	Child	Smile	Engaged	Medium
7	FT			1	5:06	Adult	Neutral	Engaged	Low
8	FT			1	5:07	Adult	Smile	Engaged	High
9	MB			1	5:09	Adult	Smile	Engaged	Medium
10	LG			1	5:11	Adult	Smile	Enthusiastic	High
11	AP			1	5:12	Adult	Smile	Engaged	High
12	MB			1	5:18	Child	Neutral	Engaged	High
13	FT			1	5:19	Child	Smile	Minimal	Low
14	YE			1	5:21	Child	Smile	Minimal	Medium
15	LG	AP		2	5:22	Child	Neutral	Engaged	High
16	MB	YE		2	5:23	Child	Smile	Enthusiastic	Medium
17	FT			1	5:23	Child	Smile	Engaged	High
18	VB			1	5:25	Child	Neutral	Minimal	Medium
19	FT			1	5:26	Child	Smile	Minimal	High
20	AP	Comic		2	5:28	Adult	Smile	Engaged	Medium
21	LG			1	5:29	Adult	Smile	Minimal	Medium
22	AP			1	5:31	Adult	Smile	Engaged	High
23	MB	YE		2	5:34	Adult	Smile	Enthusiastic	Medium
24	LG	Comic		2	5:36	Child	Smile	Enthusiastic	High
25	YE	LG		2	5:37	Child	Neutral	Engaged	High
26	FT			1	5:41	Young Adult	Smile	Engaged	High
27	MB			1	5:42	Young Adult	Smile	Engaged	High
28	MB			1	5:43	Child	Smile	Engaged	Medium
29	MB	YE		3	5:45	Child	Smile	Enthusiastic	High
30	FT		Comic	1	5:45	Child	Smile	Minimal	Low
31	YE			1	5:49	Young Adult	Smile	Engaged	Medium
32	FT			1	5:50	Child	Smile	Engaged	High
33	LG			1	5:52	Child	Smile	Minimal	None
34	AP			1	5:53	Child	Smile	Minimal	Medium
35	MB			1	5:55	Child	Smile	None	Low
36	AP			1	5:55	Child	Smile	Engaged	Medium
37	LG	Comic		2	6:05	Adult	Smile	Minimal	High
38	FT	Comic		2	6:07	Child	Smile	Engaged	Medium
39	LG			1	6:08	Adult	Smile	Minimal	Low
40	FT			1	6:08	Adult	Smile	Engaged	Low
41	FT			1	6:10	Adult	Neutral	Engaged	High
42	YE	Comic		2	6:10	Child	Smile	Minimal	Medium
43	Comic			1	6:11	Child	Smile	Engaged	Medium
44	MB			1	6:11	Child	Smile	Engaged	Low
45	AP			1	6:12	Child	Smile	Engaged	Low
46	LG			1	6:13	Child	Smile	Engaged	Medium
47	LG	FT		1	6:16	Young Adult	Neutral	Engaged	Low
48	AP			1	6:19	Child	Neutral	Minimal	Low
49	AP	MB		2	6:21	Child	Smile	Minimal	Medium
50	MB	AP	YE	3	6:22	Child	Smile	Engaged	Medium
51	FT	AP	YE	3	6:24	Child	Smile	Engaged	High
52	FT	YE	LG	3	6:25	Child	Smile	Engaged	High
53	FT	YE	Comic	3	6:31	Child	Smile	Engaged	Medium
					6:32	Child	Neutral	Engaged	High

Figure 60 - Raw Data Collected from the Hochschulspektakel

**Total Revenue Information**

<b>Grant Name</b>	<b>Year 1 (CHF)</b>	<b>Year 2 (CHF)</b>	<b>Total (CHF)</b>
<b>Planned Revenue: SNSF</b>	92,604	83,488	176,092
<b>Planned Revenue: Remainder</b>	30,000		30,000
<b>Total</b>	122,604	83,488	206,092

*Figure 61 - Total Revenue Information*

**Total Cost Information**

<b>Category</b>	<b>Year 1 (CHF)</b>	<b>Year 2 (CHF)</b>	<b>Total (CHF)</b>
<b>Personal</b>	108,815	95,315	204,130
<b>Third Party Services</b>	21,000	18,814	39,814
<b>Other Fixed Costs</b>	3,000	23,000	26,000
<b>Total</b>	132,815	137,129	269,944

*Figure 62 - Total Cost Information*

**Remainder Not Covered by Total Grant Revenue**

<b>Category</b>	<b>Total (CHF)</b>
<b>Remainder not covered by grant revenue</b>	63,852

*Figure 63 - Remainder Not Covered by Total Grant Revenue*

**Itemization of SNSF AGORA Grant (overview)**

<b>Category</b>	<b>Year 1 (CHF)</b>	<b>Year 2 (CHF)</b>	<b>Total (CHF)</b>
<b>Project costs</b>	24,000	21,814	45,814
<b>Salaries</b>	59,602	53,602	113,204
<b>Social Security Contributions</b>	9,002	8,072	17,074
<b>Total</b>	92,604	83,488	176,092

*Figure 64 - Itemization of SNSF AGORA Grant (overview)*

**Itemization of SNSF AGORA Grant (detailed)**

<b>Category</b>	<b>Year 1 (CHF)</b>	<b>Year 2 (CHF)</b>	<b>Total (CHF)</b>
<b>Project Costs</b>			
Fee, Illustration, Julia Durr (offer)	7,000	2,650	9,650
Fee, Graphic Design, Julia Durr (offer)	2,000	3,500	5,500
Fee, Prepress, Julia Durr (offer)	0	3,800	3,800
Fee, Writing, Marcel Raabe	10,000	6,864	16,864
Travel Expenses (Durr and Raabe)	2,000	2,000	4,000
Material for workshops (laboratory coat and protective goggles for children, consumables)	3,000	3,000	6,000
<b>Salaries</b>			
Verena Looser, 40%	37,787	37,787	75,574
Roland Gassmann, 8%	12,000	6,000	18,000
Caroline Ulli, 18%	9,815	9,815	19,630
<b>Social Security Contributions</b>			
Verena Looser, 13.5%	5,101	5,101	10,202
Roland Gassmann, 15.5%	1,860	930	2,790
Caroline Ulli, 15.9%	2,041	2,041	4,082
<b>Total</b>	<b>92,604</b>	<b>83,488</b>	<b>176,092</b>

*Figure 65 - Itemization of SNSF AGORA Grant (detailed)*

### Budget Per Year from SNSF (overview)

Allotment	Year 1 (CHF)	Year 2 (CHF)	Total (CHF)
Project costs	24,000	21,814	45,814
Salaries	59,602	53,602	113,204
Social Security Contributions	9,002	8,072	17,074
<b>Total</b>	<b>92,604</b>	<b>83,488</b>	<b>176,092</b>

Figure 66 - Budget Per Year from SNSF (overview)

### Breakdown of Salaries

Category	Name of Someone in Category	Wage (CHF/hr)
Lecturer 2	Karin Kovar	125
Lecturer 1		110
WiMa 3 (ab LK21; WiMa with special duties)		85
WiMa 2 (LK18-LK20)	Verena Looser	75
WiMa 1 (bis LK17)		60
Scientific Assistant	Melanie Ottinger	50
Staff 2 (ab LK17)		80
Staff 1 (bis LK16)		55
Interns		15

Figure 67 - Breakdown of Salaries

### Cost of miwelt Events

Event Name	Total Cost (CHF)
Ferienpass (Children's Day)	7,812
SCNAT Jubilee	4,302

Figure 68 - Cost of miwelt Events

### Itemized Costs of Ferienpass

Category	Cost (CHF)
Concept Revision	945
Organization and Realization	6,867
<b>Total</b>	<b>7,812</b>

Figure 69 - Itemized Costs of Ferienpass

### Itemization of Concept Revision for Ferienpass

Category	Person(s) Responsible	Duration (h)	Cost (CHF)
Development of new experiments based on latest research	Verena Looser	4.2	315
Revision of content of experiments and teaching material	Verena Looser	4.2	315
Revision of experiment protocols and teaching materials	Verena Looser	4.2	315
<b>Total</b>			<b>945</b>

Figure 70 - Itemization of Concept Revision for Ferienpass

**Itemization for Organization and Realization of Ferienpass**

<b>Category</b>	<b>Person(s) Responsible</b>	<b>Duration (h)</b>	<b>Cost (CHF)</b>
<b>Ordering and purchasing</b>	Melanie Ottinger, Marina Stadler	16.8	840
<b>Communication (info letter for parents, organization, advertising)</b>	Melanie Ottinger, Marina Stadler	8.4	420
<b>Communication (announcement)</b>	Verena Looser	4.2	315
<b>Preparation of school laboratory (devices, single-use material, cell cultures, gifts) and clean-up afterwards</b>	Melanie Ottinger, Marina Stadler	16.8	840
<b>Preparation of school laboratory (devices, single-use material, cell cultures, gifts) and clean-up afterwards</b>	Rene Nussbaumer (student)	16.8	504
<b>Realization</b>	Katrin Hecht, Verena Looser	16.8	1,260
<b>Realization</b>	Matthias Barmettler, Iwo Zamora, Melanie Ottinger, Marina Stadler	33.6	1,680
<b>Realization</b>	Fabian, Bettina, Rene, Valentina (students)	33.6	1,008
<b>Total</b>			6,867

*Figure 71 - Itemization of Organization and Realization for Ferienpass*



### Itemized Costs of SCNAT Jubilee

Category	Cost (CHF)
Concept Development	891
Organization and Realization	3,411
<b>Total</b>	<b>4,302</b>

Figure 72 - Itemized Costs of SCNAT Jubilee

### Itemization of Concept Development for SCNAT Jubilee

Category	Person(s) Responsible	Duration (h)	Cost (CHF)
Development of content for hawker's tray	Verena Looser	4.2	315
Development of content for hawker's tray	Melanie Ottinger	4.2	225
Development of content for hawker's tray	Valentina (students)	4.2	126
Revision of content for hawker's tray	Melanie Ottinger	4.2	225
<b>Total</b>			<b>891</b>

Figure 73 - Itemization of Concept Development for SCNAT Jubilee

**Itemization of Organization and Realization for SCNAT Jubilee**

<b>Category</b>	<b>Person(s) Responsible</b>	<b>Duration (h)</b>	<b>Cost (CHF)</b>
<b>Ordering and purchasing</b>	Melanie Ottinger	2.1	105
<b>Communication (info letter for parents, organization, advertising)</b>	Melanie Ottinger	4.2	210
<b>Communication (announcement)</b>	Verena Looser	4.2	315
<b>Preparation for street performance</b>	Melanie Ottinger, Marina Stadler	16.8	840
<b>Preparation for street performance</b>	Valentina (student)	12.6	378
<b>Street Performance</b>	Melanie Ottinger	8.4	420
<b>Street Performance</b>	Valentina (student)	8.4	252
<b>Total</b>			3,411

*Figure 74 - Itemization of Organization and Realization for SCNAT Jubilee*



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Ihre Kundennummer:  
K-513575

Ihre Jobnummer:  
J-49958

Ihre Rechnungsnummer:  
R-3151678

**Leistungsdatum:**  
Entspricht dem Rechnungsdatum.

## Rechnung

vom 3.8.2015

Guten Tag Frau Julia Dürr,  
wir erlauben uns, im Rahmen dieser Rechnung folgende Leistungen zu berechnen:

Anzahl	Position	Preis in EUR
150	<b>Basisprodukt</b>	<b>208,04</b>
	Rückendraht-gebundenes Heft	
	DIN A5 210 x 148 mm, im Hochformat	
	<b>Druck</b>	
	16 Farb-Seiten (CMYK)	
	Papier wird beidseitig bedruckt	
	Auf 250g/qm ColorCopy - matt, satiniert (Hoch-Weiß) Papier	
	<b>Verarbeitung</b>	
	Produkt wird links gebunden	
	<b>Produktion</b>	
	Produktion der Gesamtauflage folgt nach Datenübergabe.	
	Wunschtermin: 03.08.2015 (Bestätigung erforderlich)	
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	<b>19% MWSt.</b>	<b>39,53</b>
	<b>Endbetrag</b>	<b>247,57</b>

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Rechnung 3151678

Seite 1 von 1

Figure 75 - Invoice for miwelt Comic Book



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Kristin Schlötel und Norman Schlötel

**Ihre Kundennummer:**  
K-513575

**Ihre Jobnummer:**  
J-45959

**Ihre Rechnungsnummer:**  
R-3151679

**Leistungsdatum:**  
Entspricht dem Rechnungsdatum.

## Rechnung

vom 3.8.2015

Guten Tag Frau Julia Dürr,  
wir erlauben uns, im Rahmen dieser Rechnung folgende Leistungen zu berechnen:

Anzahl	Position	Preis in EUR
150	<b>Basisprodukt</b>	<b>219,81</b>
	Rückendraht-gebundenes Heft "miwelt_A6_Heft"	
	DIN A6 148 x 105 mm, im Hochformat	
	<b>Inhalt-Druck</b>	
	28 Farb-Seiten (CMYK)	
	Papier wird beidseitig bedruckt	
	Auf 120g/qm Buchdruck - ungestrichen (gelblich-weiß) Papier	
	<b>Cover-Druck</b>	
	Aussenseite farbig bedruckt (CMYK)	
	Innenseite farbig bedruckt (CMYK)	
	Auf 250g/qm Bilderdruck - matt gestrichen (Weiß) Papier	
	<b>Verarbeitung</b>	
	Produkt wird links gebunden	
	<b>Produktion</b>	
	Produktion der Gesamtauflage folgt nach Datenübergabe.	
	Wunschtermin: 03.08.2015 (Bestätigung erforderlich)	
	<b>Lieferung</b>	
	In Kartons verpackt (Standard)	
	Innerhalb Deutschlands, versichert	
	<b>Daten</b>	
	Vom Kunden als druck-fähige PDF-Daten hochgeladen	
	Für die Dauer des Auftrags gespeichert	
Dieser Artikel enthält bereits 5,00 EUR (netto) für o.g. Versanddienstleistungen.		
<b>Summe</b>		<b>219,81</b>
<b>19% MWSt.</b>		<b>41,76</b>
<b>Endbetrag</b>		<b>261,57</b>

Der Rechnungsbetrag ist sofort fällig und zahlbar innerhalb von zwei Wochen ab Rechnungsdatum auf das unten genannte Konto. Sie kommen mit der Zahlung spätestens in Verzug, wenn Sie nicht 30 Tage nach Fälligkeit und Erhalt der Rechnung oder einer gleichwertigen Zahlungsaufstellung geleistet haben. Bitte geben Sie als Verwendungszweck Ihren Namen, Ihre Kunden- und Rechnungsnummer an.

Mit freundlichen Grüßen

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Rechnung 3151679

Seite 1 von 2

Figure 76 - Invoice for Yeast Balloon Experiment Booklet

\*Note: Figures 75 and 76 were received and appended on 10/12/15. Due to time constraints, they were not incorporated into the analysis.

---

Dear ZHAW Faculty and Staff,

We are three students from Worcester Polytechnic Institute (WPI), a university in the United States. As part of our undergraduate program, we have traveled to Switzerland to collaborate with Professor Doctor Karin Kovar on developing methods to sustain the miwelt project, an educational outreach program focused on introducing primary school students to the “invisible world of microorganisms.” In order to better understand the Swiss public’s opinion on corporate sponsorship for educational programs, we would like to collect some information from you. We would appreciate your input on the following brief survey.

Kind regards,

Nicholas Brocato  
Khasan Dymov  
Ian Shusdock

---

*All surveys are anonymous and will be kept strictly confidential.*

1. Please answer the following questions using the provided scale (Never, probably not, probably, absolutely). If you do not have any children, please answer these questions as if you do.
  - a. Would you send your child(ren) to a free educational program in life sciences?
  - b. Would you pay to send your child(ren) to a (1 day) educational program in life sciences?
    - i. (If answered probably not, probably, or absolutely) What is the most you would pay to send your child to a one day educational program in life sciences? (free text entry) \_\_\_\_\_ CHF
  - c. Would you send your child(ren) to a free educational program in life sciences that is sponsored by a company?

**2. What is your overall opinion on biotechnology corporations in Switzerland?**

- a. Strongly dislike
- b. Dislike
- c. Neutral
- d. Like
- e. Strongly like

Please explain: \_\_\_\_\_

**3. Are there any biotechnology corporations that influenced your selection for Question #2? Please list them here. (free text entry)**

**4. How do you feel about the quantity of microbial biotechnology education in primary schools?**

- a. Not enough
- b. Enough
- c. Too much
- d. I don't know

**5. How do you feel about the quality of microbial biotechnology education in primary schools?**

- a. Excellent
- b. Good
- c. Okay
- d. Poor
- e. I don't know

**6. Which of the following describes you?**

- a. Student studying biotechnology
- b. Student *not* studying biotechnology
- c. Biotechnology employee or educator
- d. Non-biotechnology employee or educator
- e. Other, please explain

**7. If you would like to provide us with any additional information about your opinion on corporate sponsorship of educational programs, please do so here: (free text entry)**

*Thank you for your time. Your responses are greatly appreciated.*

Figure 77 - Survey Distributed to ZHAW Life Science Department

**Responses to Question 1 of the ZHAW Life Science Department Survey**

Question	Never (#)	Probably Not (#)	Probably (#)	Absolutely (#)
Would you send your child(ren) to a free educational program in life sciences?	0	3	70	106
Would you send your child(ren) to a free educational program in life sciences that is sponsored by a company?	4	28	102	45
Would you pay to send your child(ren) to a 1 day educational program in life sciences?	5	21	115	38

Figure 78 - Responses to Question 1 of the ZHAW Life Science Department Survey

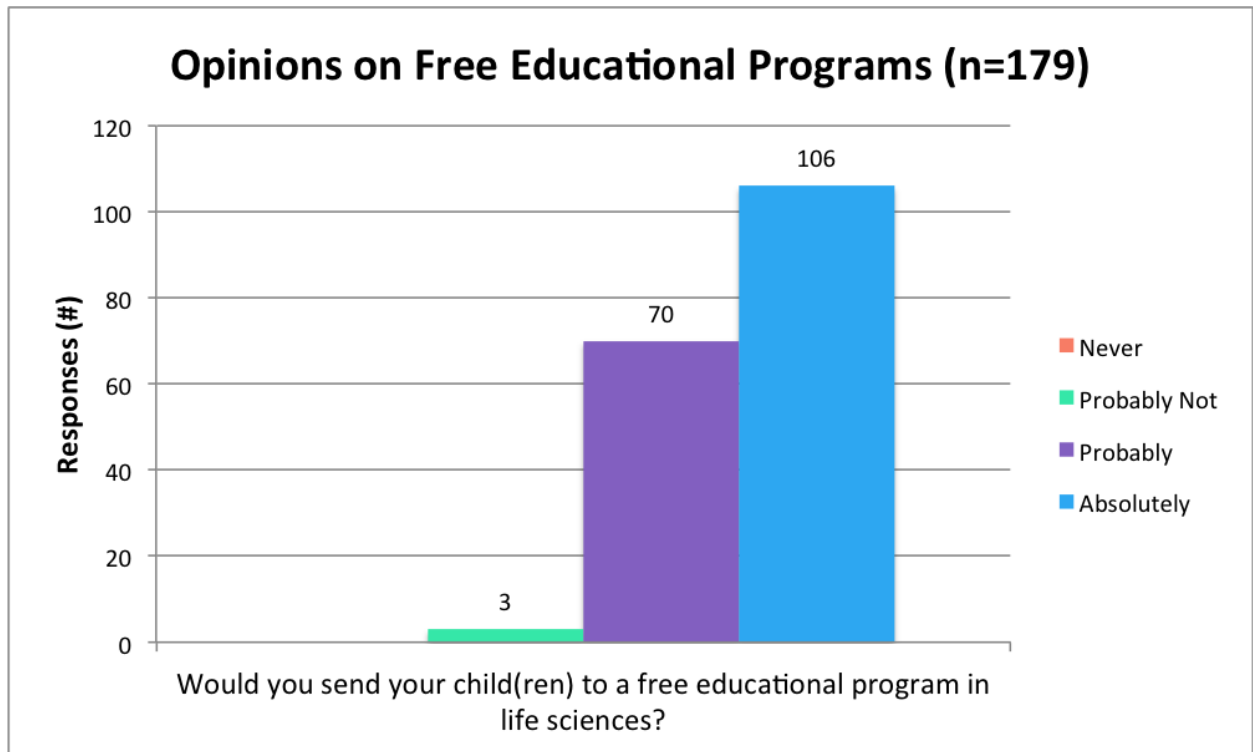


Figure 79 – Visualization of Responses to Question 1a of the ZHAW Life Science Department Survey

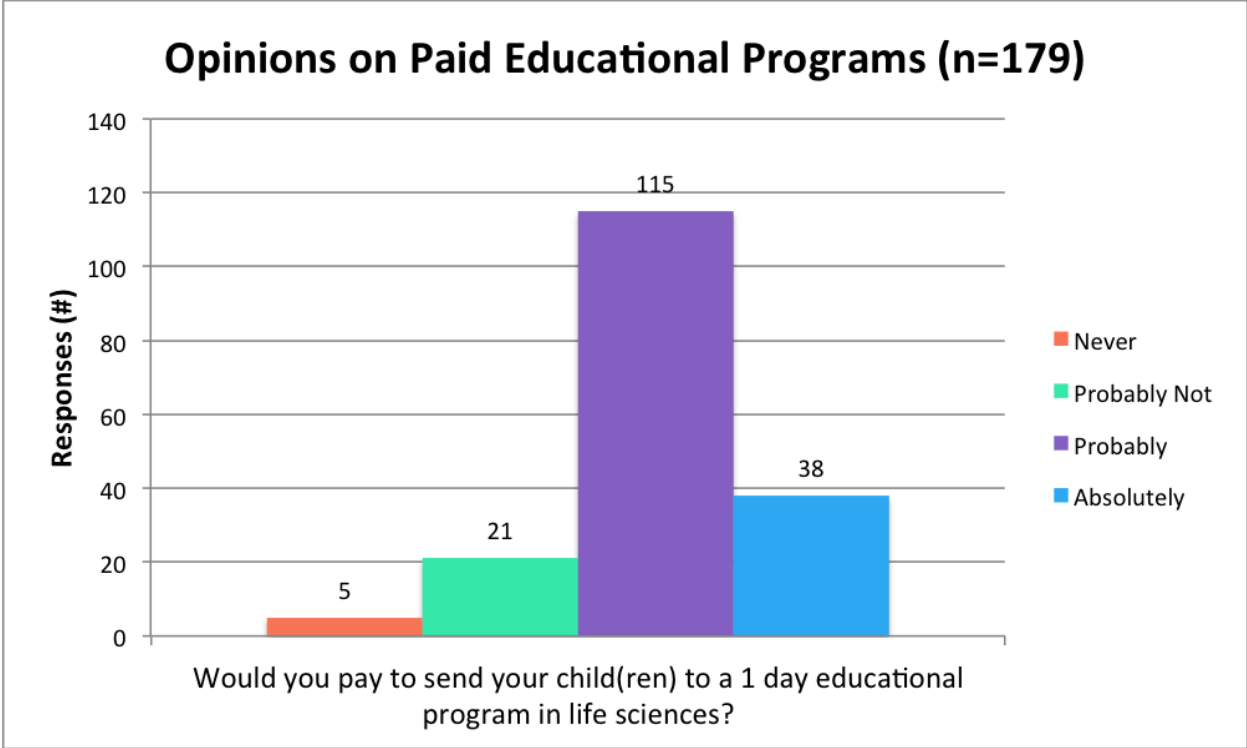


Figure 80 - Visualization of Responses to Question 1c of the ZHAW Life Science Department Survey



**Raw Data for Question 1c Extension: “What is the most you would pay to send your child to a one day educational program in life sciences? (CHF)”**

Raw Data: Amount (CHF) (n=157)							
100	150	100	180	100	150	100	50
50	150	250	75	100	100	50	50
50	100	200	250	25	10	30	120
50	80	150	200	50	150	100	70
50	100	200	60	100	30	50	300
0	45	120	500	60	350	200	30
150	90	50	25	200	30	200	100
1000	300	50	60	10	100	50	70
70	20	70	150	100	30	150	50
400	50	50	50	50	20	100	50
60	50	50	300	50	50	10000	50
50	20	80	50	35	60	1000	50
300	50	0	200	60	100	50	200
1500	1000 0	10	35	100	50	100	200
50	30	60	200	80	10	250	80
100	90	50	50	300	100	20	300
100	200	50	30	70	100	100	100
80	50	100	100	100	500	50	30
25	200	0	0	100	500	10000	
100	200	100	200	60	50	30	
50	30	30	50	100	150	50	
<b>AVERAGE:</b>	<b>303</b>						

Figure 81 - Total Responses to Question 1c Extension of the ZHAW Life Science Department Survey

Truncated Data for Question 1c Extension: “What is the most you would pay to send your child to a one day educational program in life sciences? (CHF)”

Conditional Data ( $x < 1000$ ): Amount (CHF) (n=151)							
100	150	100	180	100	150	100	50
50	150	250	75	100	100	50	50
50	100	200	250	25	10	30	120
50	80	150	200	50	150	100	70
50	100	200	60	100	30	50	300
0	45	120	500	60	350	200	30
150	90	50	25	200	30	200	100
	300	50	60	10	100	50	70
70	20	70	150	100	30	150	50
400	50	50	50	50	20	100	50
60	50	50	300	50	50		50
50	20	80	50	35	60		50
300	50	0	200	60	100	50	200
		10	35	100	50	100	200
50	30	60	200	80	10	250	80
100	90	50	50	300	100	20	300
100	200	50	30	70	100	100	100
80	50	100	100	100	500	50	30
25	200	0	0	100	500		
100	200	100	200	60	50	30	
50	30	30	50	100	150	50	
<b>AVERAGE:</b>	<b>103</b>						

Figure 82 - Truncated Responses for Question 1c Extension of the ZHAW Life Science Department Survey

**Responses to Question 2a of the ZHAW Life Science Department Survey: “What is your overall opinion on biotechnology corporations in Switzerland?”**

Answer	Response (#)	%
Strongly dislike	3	2%
Dislike	9	6%
Neutral	66	45%
Like	47	32%
Strongly like	22	15%
Total:	147	100%

Figure 83 - Responses to Question 2a of the ZHAW Life Science Department Survey

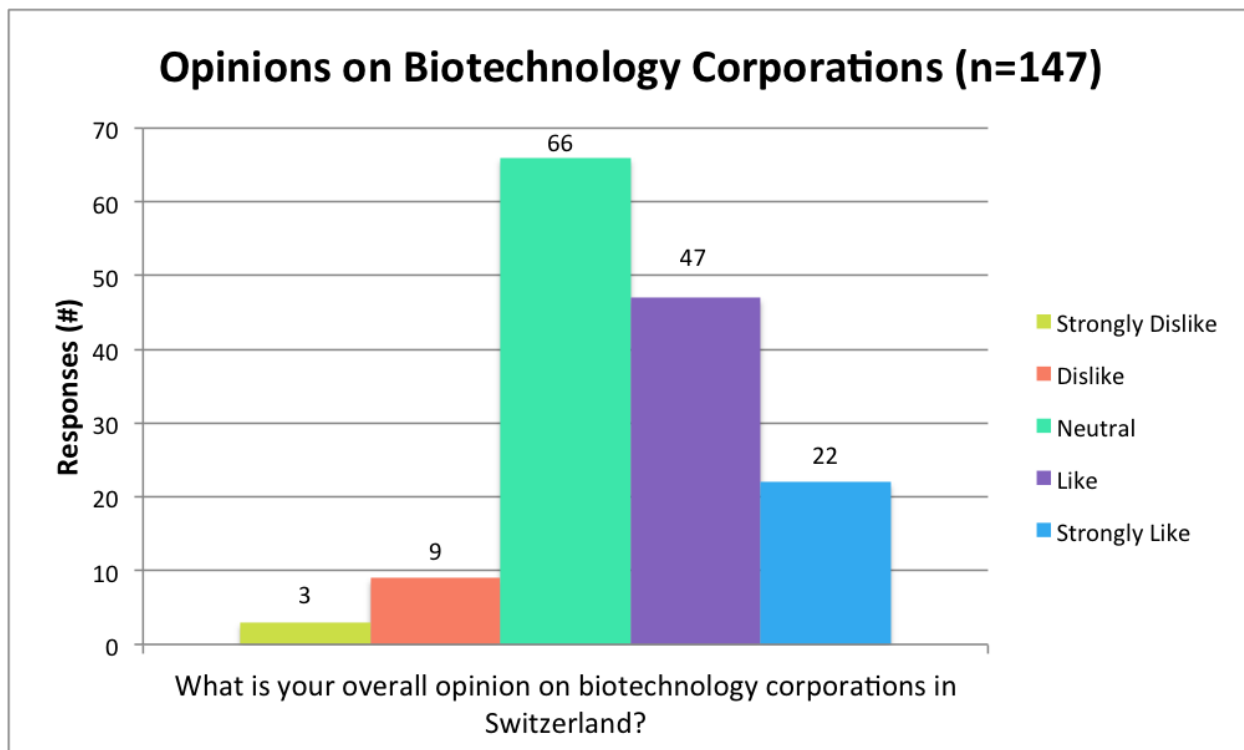


Figure 84 - Visualization of Responses to Question 2a of the ZHAW Life Science Department Survey

**Responses to Question 4 of the ZHAW Life Science Department Survey: “How do you feel about the quantity of microbial biotechnology education in primary schools?”**

Answer	Response (#)	%
Not enough	69	48%
Enough	28	19%
Too much	0	0%
I don't know	47	33%
<b>Total:</b>	<b>144</b>	<b>100%</b>

Figure 85 - Responses to Question 4 of the ZHAW Life Science Department Survey

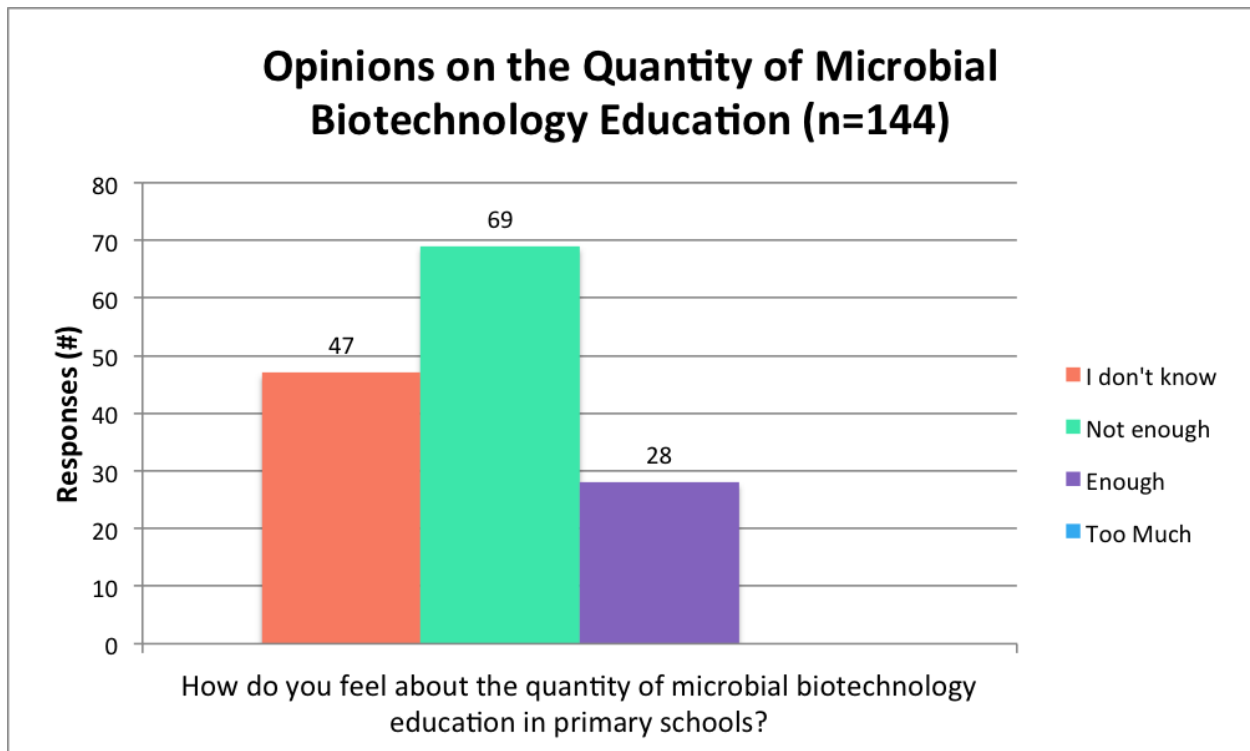


Figure 86 - Visualization of Responses to Question 4 of the ZHAW Life Science Department Survey

**Responses to Question 5 of the ZHAW Life Science Department Survey: “How do you feel about the quality of microbial biotechnology education in primary schools?”**

Answer	Response (#)	%
Excellent	0	0%
Good	9	6%
Okay	35	24%
Poor	45	31%
I don't know	55	38%
<b>Total:</b>	<b>144</b>	<b>100%</b>

Figure 87 - Responses to Question 5 of the ZHAW Life Science Department Survey

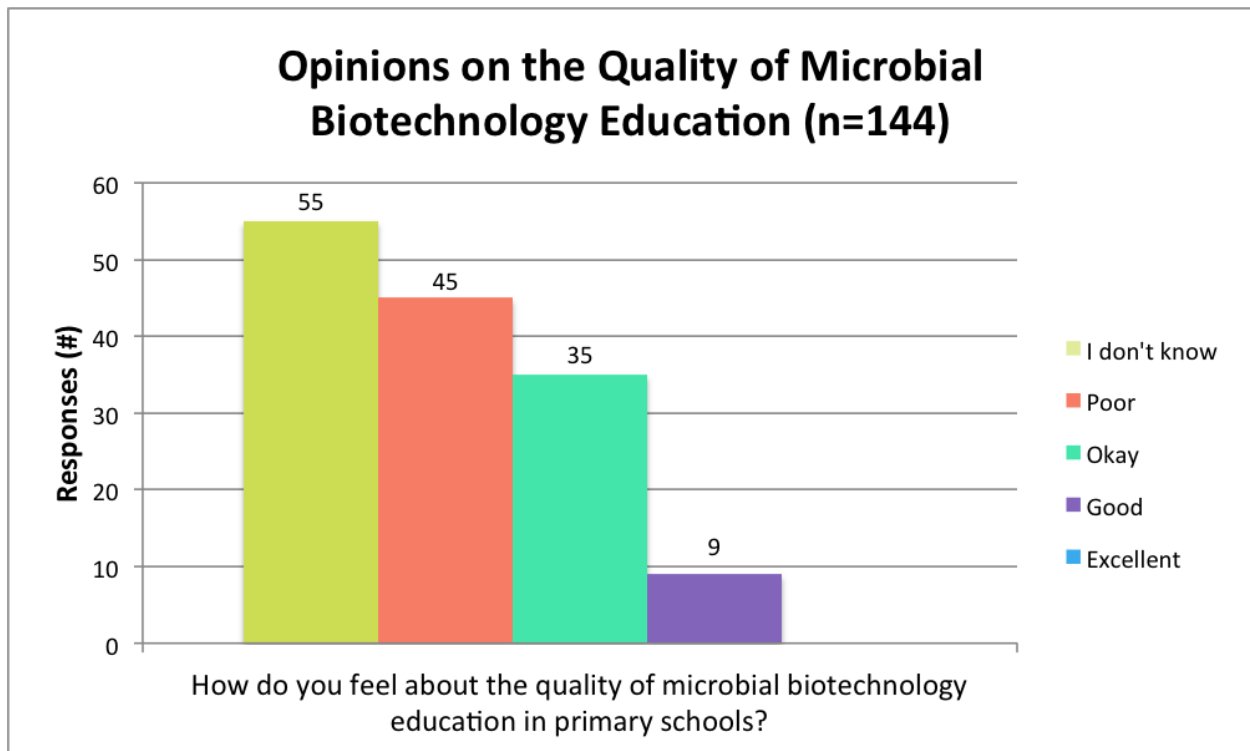


Figure 88 - Visualization of Responses to Question 5 of the ZHAW Life Science Department Survey

**Responses to Question 6 of the ZHAW Life Science Department Survey: "Which of the following best describes you?"**

Answer	Response (#)	%
Student studying biotechnology	20	14%
Student not studying biotechnology	54	38%
Biotechnology employee or educator	15	11%
Non-biotechnology employee or educator	38	27%
Other, please explain	14	10%
Total	141	100%

Figure 89 - Responses to Question 6 of the ZHAW Life Science Department Survey

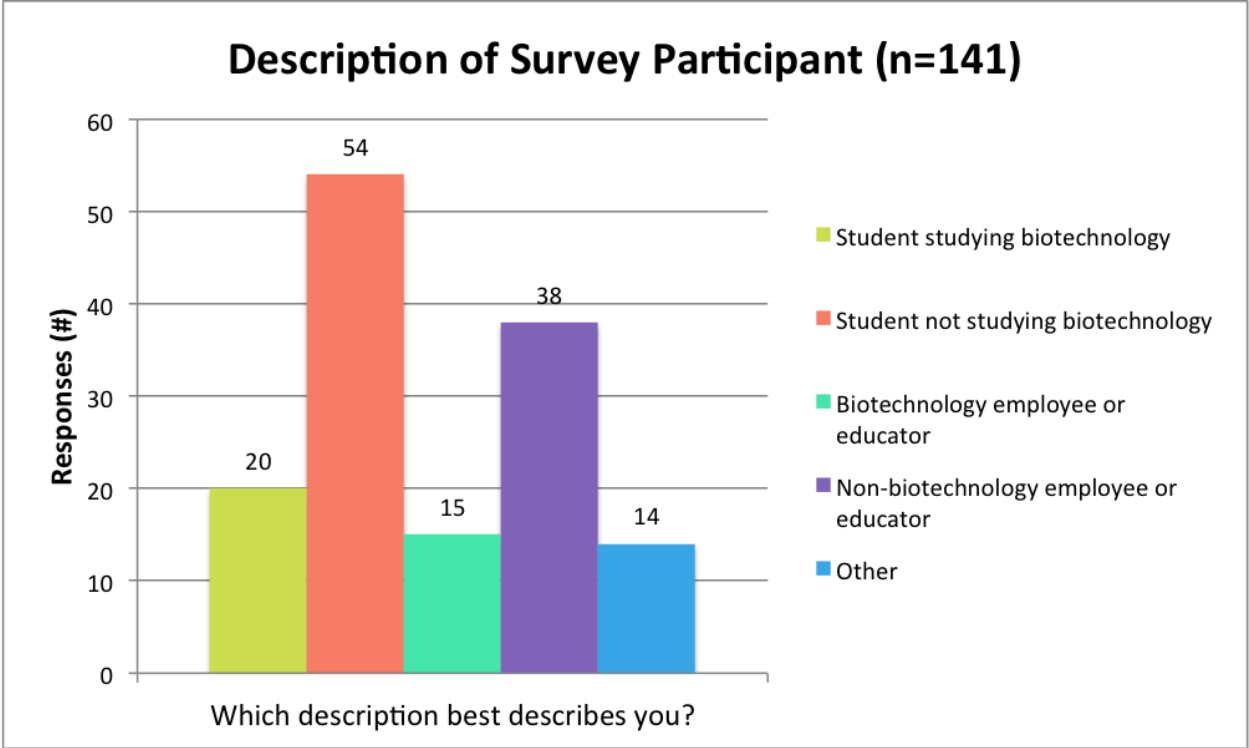


Figure 90 - Visualization of Responses to Question 6 of the ZHAW Life Science Department Survey