Designing a Makerspace for the Buchs Regional Library

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ABSTRACT

Bibliothek Buchs is scheduled to move in 2024 and plans to add a makerspace to their new location. We identified community interest in topics to be offered in this space. We worked with Mr. Köppel, the head of the Makerspace project, to hold in-person interviews with library members, visit existing makerspaces, and offer a Qualtrics survey to confirm community interest. Finally, we provided Bibliothek Buchs with a member interest analysis and a sample makerspace layout together with an equipment list.

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EXECUTIVE SUMMARY

Every community needs a place to gather and attract people; libraries are often centers for knowledge in communities. A combination of a library's resources and a space for project creation can act as a hub of innovation. Bibliothek Buchs is moving to a new library location in Buchs and is planning on adding a makerspace. As an institution with over 2,000 registered members, it is important for the Buchs library to combine curiosity and education in a fluid space for the purpose of enabling members to design, prototype, and create projects that would not be possible if not for the resources accessible from the library.

Outside of the classroom, the ability to learn can be limited by lack of opportunity, resources, and exposure to new ideas. A way to foster curiosity in a community is through a makerspace which enables curiosity in a community with equipment, materials, and workshops. Bibliothek Buchs is our sponsor for this project and we worked with Philipp Köppel, who is head of the makerspace project. The goal of this project was to develop recommendations for a list of equipment based on budget and interest as well as a layout suggestion that aligns with the goal that Bibliothek Buchs' new makerspace will offer all ages a space to create and innovate together.

Each community has unique project interests and knowing these interests can be used to design a collaboration space for them to create projects. Gathering themes of interest ensures this space avoids the curriculum driven closed-access that ties users to a specific course of interest. To do this, we were able to gather 14 interviewees to participate in our semi-structured interview. Our team asked about their individual interests with a guideline of interview questions to structure these conversations. Through less structured interviews we were able to collect the independent opinions of interviewees. At the end of our interviews, we were able to collect about 23% of daily library patrons' opinions. We moved on to categorizing the areas of interest of the interviewees which brought about three main categories of Engineering / Robotics, Sciences, and Arts. With these interests in mind, we were able to move on to our next step of visiting local makerspaces.

Local makerspaces are the experts in our research field, in meeting with staff and touring their facilities, we can find out their equipment and tailor the themes of interest into specific tools and equipment. We were able to interview four local makerspace staff members and tour their facilities: Landquart Kinderlab, Fablab, ETH Project House, and Brütwerk. From each unique makerspace, we created a list of tools and equipment as well as some workshops that are offered. With this list, we were able to match the interests of the community members found in our semi-structured interviews to the tool and equipment offerings at these makerspaces.

Finally, we returned to the Buchs library community to create a ranked list of interests and equipment from local makerspaces aligned with the interests of the community. Making use of Qualtrics, a survey generator, we asked members to agree to a consent form, once again rank their top three themes of interest, select whether or not a piece of equipment is of interest to them

or if they are interested in attending a workshop, and their age range. After translating the survey into German using Qualtrics translation options and our sponsor's approval, it was sent out to the library member email list and posted as a QR code at the front desk of the library. After a week, we took the 56 survey results and determined the area of most interest was art, followed by sciences, music, and wood / metal working which all had similar levels of interest. Engineering / robotics ranked lower, with computer science being last in interest. In the equipment selection question, patrons showed greatest interest in woodworking / hand tools and a greatest workshop interest in photo editing and 3D printing. The equipment of least interest to patrons were computer programming, Computer Aided Design (CAD), and microcontrollers and electronics. This is potentially because computer science can be a daunting topic to learn. This could lead to people being interested in introductory workshops to get community members more comfortable with this topic.

During our expert interviews, we visited a makerspace supplier, Bischoff AG, which is a makerspace supplier. The cost information gathered from Bischoff was used to value the equipment that the library members showed interest in. Using the total cost associated with each form of equipment we divided by the total number of patrons interested, interested and interested in a workshop, to obtain a cost / interest ratio. The lower the cost to interest ratio, the higher the priority of that equipment on our recommendation. From this a prioritized equipment list was created in the order of: computer programming (highest priority), CAD, photo editing software, sewing equipment, woodworking / hand tools, 3D printer, robotics, microcontrollers and electronics, and a laser cutter (lowest priority).

This prioritized list allowed us to estimate a space, between the area of 25m^2 and 50m^2, and suggest a set up of the makerspace. If everything in this budgeted list is included in the makerspace design, the total cost would be 7,000 CHF. The layout consists of a separate computer lab area for the six computers that the library already owns, with a separate larger area that can be closed off to account for sound control, to not disturb library patrons. In the center of the separate room is a collaboration zone, a large work table on wheels so it may be moved outside to allow for a versatile work space during workshops. When facing into the room from the door entry, on the right against the corner and far wall is the woodworking area that is stocked with general hand tools, hammers, nails, and wood glue for small woodworking projects. In the front right wall corner is the 3D printer area, which received a lot of interest especially in our survey, and will consist of a Prusa printer and a project display area. To the left of the 3D printer area is the laser cutter, which is the largest budget item, at 2,200 CHF, a xTool M1 laser cutter. To the left of this laser cutter, is the electronics and robotics area, with general electronic parts, arduinos, and some Ozobot EVO robots. Left of this electronics area, in the corner, is the arts and craft area, which will consist of a large table with general arts, paints, and especially sewing supplies. Finally, in the corner to the left of this arts table, is the storage area where library members are able to store their projects for future work.

This space is designed to allow for up to twelve people to be working in the makerspace at a time. This is approximated based on projected available equipment and an estimated size of

the space. The intention for this design is so that, for example, Mr. Köppel can be holding a workshop in the collaboration zone and other library members can be designing their 3D print on a computer in the computer lab area. Another example is someone is laser cutting a doll house and gluing it together in the woodworking area while another person is wiring an arduino in the electronics and robotics area.

Our design leaves room for future areas of community interest to create a living makerspace that continuously represents member's interest. Collaborations are important to expand project interests, by connecting with local institutions and other local makerspaces, such as Brütwerk. Similarly, in our semi-structured interviews we were able to connect with community members who are willing to teach workshops at the library's new makerspace. This will assist the library in having community members for workshop leaders to ensure sustainability and variety of workshops.

Finally, we hope that our projected budget will be useful to Bibliothek Buchs when seeking donors. Our design is adaptable as the library gains these sponsors and a finalized idea of the area they will have in their new location in 2024. We hope that the future of the makerspace will fit the interests of Buchs library members, so that they will be able to take full advantage of this project space to collaborate and expand their interests within their community.

1.0 Introduction

Makerspaces are a product of the maker movement, they are physical sites that host project creation in areas like art, science, and engineering. As a broad concept, the development of these sites varies across the organizations, companies, and libraries who create these spaces, emphasizing different opportunities that align with their missions and interests. By blending different opportunities, makerspaces offer informal learning and teaching that relies on hands-on do-it-your-self (DIY) projects. The resources provided at these sites are specific to the location and interests of the community, or the "makers" who are the users of the site (Dousay, 2017). Organizations have been adapting these spaces to represent their own specific creative emphasis, allowing for their members to have the opportunity to explore their interests and advance their own skills. Organizations work to provide their members with makerspaces, representing the growing value of such opportunities among the broader population (Dousay, 2017). In particular, as the world further advances technologically, opportunities for up-to-date resources and skill development become more crucial in the general population to allow for an informed and educated population.

Switzerland, as a technological world leader, has historically put great emphasis on education, acknowledging that a well-educated public is beneficial to the entire country (Barabash, 2019). Switzerland focuses on incorporating the newest and most advanced technological resources from around the world in the country's educational curriculum. In a more local focus, collaborative workspaces aim to address any technological gaps in education and offer a place where people with similar interests can learn together. There is an overlap between the mission of makerspaces and the educational values of Switzerland; both focus on giving individuals the ability and guidance to practice and learn in a hands-on fashion. Makerspaces are a newer global concept, specifically designed to give people the space and tools to transfer their ideas into reality. Over the last years, Switzerland has been one of the world's leaders in innovation, so a place where people can create and develop technologies is an excellent cultural fit. However, the maker movement and its spaces have not yet reached their potential in smaller communities, like that of our sponsor.

Generally, smaller communities are more isolated from many newer technology movements. Buchs St. Gallen has a population of just over 11,000 residents, which corresponds to only 3% of the population of Zürich (Switzerland's biggest city) (O'Neill, 2022). Even though the town boasts a University of Applied Sciences with an emphasis on engineering, as well as multiple high-tech companies in the vicinity, the community has little access to a public technology creation space. Although the Buchs community is not unique in this regard, compared to the cities around Europe, there is a disparity in the up-to-date access to technology resources (Eeckhout, 2021). To address these problems, the government of Switzerland supports educational projects that incentivize and promote development of a wide variety of 21st century skills and knowledge (SERI, 2020). Local organizations like Bibliothek Buchs, the local library, already have some creative programs and educational opportunities that help build skills for the community, but they are looking to expand what they can offer the community (Köppel, 2022).

Bibliothek Buchs is working towards moving to a new location in conjunction with a local toy library. Integrating a makerspace within that new building is an excellent opportunity to acquaint residents with the maker movement and give them a chance to explore technologies that they might not otherwise encounter. Makerspaces offer hands-on learning, which encourages creativity and promotes taking initiative and self-management through project-based opportunities, and that would greatly benefit the Buchs community. Mr. Philipp Köppel, head of the makerspace project, particularly identified the lack of science, technology, engineering, and math (STEM) related music and art project opportunities. Mr Köppel would like to address this in the new location, anticipating this as a way to interest the local community in STEM topics.

2.0 Swiss Makerspace Creation in 2022

2.1 Makerspaces and Innovation in Switzerland

2.1.1 The Maker Movement and Makerspaces

The maker movement describes people who come together to learn, share ideas, and use makerspace resources to bring their projects to reality (Dousay, 2017). Similarly, a maker describes an individual who participates and identifies along with the maker community. Researchers also describe the "maker mindset" to relate makers' identity and cognition (Willet, 2018). Experienced makers can serve as instructors, guides or advisors to less experienced makers and encourage them to explore multidisciplinary solutions and points of view to a certain problem. This teaching method enables makers to learn and decide which approaches can benefit their project. However as this method is not as conventional and is dependent on the students interest it isn't applied commonly in schools. Due to this makers create alternative spaces to explore the concept, and the most prevalent of these spaces are makerspaces.

A makerspace is a place where makers with similar interests can gather to work on projects using shared equipment and knowledge. Makerspaces offer unique learning and teaching approaches based on hands-on projects and experimentation. Makerspaces usually offer workshops and classes in which members can explore a new tool or material, use a digital device, and work on a project to develop new skills. Project-based learning techniques can help improve student engagement by enabling knowledge, information sharing, and discussion (Almulla, 2020). Museums, schools, universities, and libraries are examples of institutions that collaborate with makerspaces and make use of the variety of tools, resources, and educational techniques offered (Mersand, 2020). Collaborations result in the integration of less formal, project-based learning methods into curriculum.

Not all makerspaces are designed for the same areas of interest. Resources are dependent on the makerspace; it can have different tools, dedicated workspaces, and materials that fit the interests and needs of its community (Mersand, 2020). Some common areas of interest in makerspaces are prototyping, wood making, electronics, and robotics. Prototyping-focused makerspaces provide resources like 3D printers, computer numerical control (CNC) and printed circuit board (PCB) milling machines, and laser cutters (Boear, 2015). Makerspaces can give members unfamiliar with concepts, simple projects to design and build. An example is the arduino piano in Figure 1 which can help introduce makers to basic concepts with microcontrollers. Other local interests are based on music and art, which typically rely heavily on digital technologies (Dousay, 2017). Makerspaces provide a place for members to work and learn safely, using resources they might not otherwise have access to.
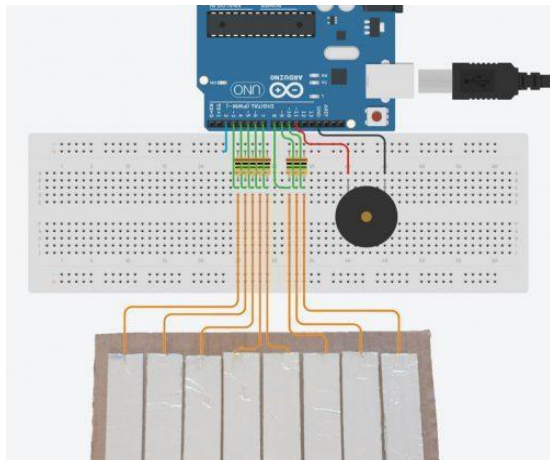
Figure 1. Arduino tinfoil piano. An example of an Arduino-powered piano project that could be made at a makerspace.

From *Open Electronics,* By Bianchi Gabriele (https://www.open-electronics.org/arduino-tinfoil-piano/). CC BY 3.0.

Depending on the complexity and risks that involve the use of its resources, makerspaces can define their unique rules and protocols. It is crucial for makerspaces to provide adequate training and safety guidelines to its users (Moorefield-Lang, 2015). Staff members can divide these safety modules, making some of them optional or required, which gives access to their corresponding tools and equipment. For this reason, through liability forms and user agreements, makerspaces describe the policies for each of their equipment and resources (Moorefield-Lang, 2015). Some common guidelines are the use of safety glasses, gloves, and hearing protection while working in certain workspaces. Along with keeping the patrons safe, teaching safety guidelines informs users of the proper procedure to operate certain equipment to further develop their knowledge and understanding.

2.1.2 Innovation in Switzerland

What does it mean to create something, advance further, and progress the technology of the world? All these fall under the umbrella of innovation and the goal to further develop and improve our understanding of the world. Specifically for engineering and technology, innovation is a prevalent topic as the idea of developing new and more advanced technologies aligns with the principles of innovation. Innovation to engineering is the driving force, keeping a progression of advancement to the field. From the first car to the technology packed vehicles of today, innovation is responsible for countless advancements. Even in the past ten years the development of technology has seen immense innovation with the progression of cellular devices just a footnote in the grand scale of advancement.

In order to support innovation, funding for project expansion from Research and Development (R&D) is beneficial. In the case of Switzerland, the emphasis on R&D and education at the government level has been passed down to town governments. As shown in Figure 2, the linearized graph of R&D spending vs sales of innovation products, which shows funding that went towards institutions and businesses. This positive relationship shows the importance of this funding to maintain the growth of institutions and company performance. Every city has a budget and with that a certain amount will be dedicated to education and general infrastructure renovations, giving towns the financial ability to fund projects that promote education. In order to expand project creation in Buchs SG, a makerspace would be a logical addition to give the community a space for project development.
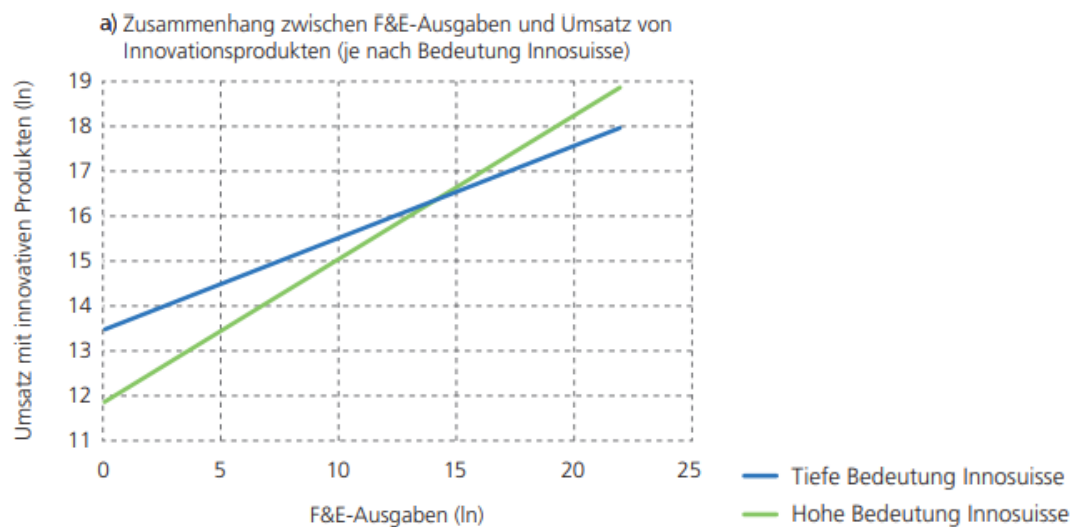
Figure 2. Switzerland's Spending on Research and Development for Innovation Funding in 2018

As seen in the figure, on the x-axis is R&D Spending and on the y-axis is Sales of Innovation Products. The blue line shows the natural log of the Average Reprinted from SBFI (2020): Forschung und Innovation in der Schweiz 2020, p. 268. Bern: *Staatssekretariat für Bildung, Forschung und Innovation*, with permission from SBFI.

Makerspaces are ideal locations for innovation and can be found all over the world. While makerspaces may pick up cultural influences depending on their location, overall they all serve the same project creating focus (Mersand, 2021). Makerspaces often have different names delegating certain focuses of a space for project creation. Figure 3 shows the location cluster and prominence of Fab Labs and Makerspaces in Switzerland. Fab Labs are denoted by their logos and triangles showing the ten largest makerspace groups. From German influence and other advanced technological countries, there is an interest in expanding community-operated spaces like "hackerspaces" and "fab labs" or fabrication laboratories (Köppel, 2022). The hackerspaces

are a specific type of these makerspaces, where users mainly work with computer technology learning: coding and hacking (Moorefield-Lang, 2015). Fab labs are more universal makerspaces as they are general project spaces consisting of multiple different technologies (Open Street Map, 2012). WPI has created a makerspace for use by its students in their engineering projects named the Innovation Studio, the focus of which is on STEM concepts. The Innovation studios' makerspace also aligns with WPI's STEM curriculum by offering hands-on opportunities and experience. This approach allows students to apply their knowledge and skills learned in their classes into real-world problems. In contrast to the typical engineering technologies offered at makerspaces, there is also an interest in music learning and integrating artistic opportunities for projects in Switzerland (Köppel, 2022). Within this topic of interest, there is a desire for a space where users can develop musical and artistic skills in conjunction with typical technological spaces (Mersand, 2021).
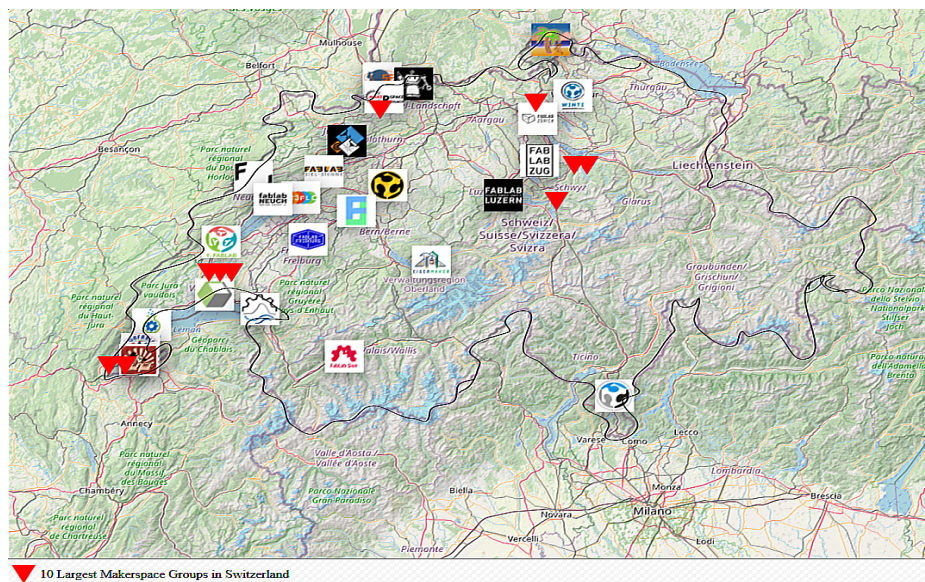
Figure 3. Map of Switzerland with Fab Labs and Makerspaces

Reprinted from Leaflet, Open Street Map contributors, Swiss FabLabs Map, CC BY-SA 2.0. Adapted from Meetup (Meetup 2022).

Finally, makerspaces provide numerous benefits to their members and community. According to Mersand, "Proponents of makerspaces believe that makerspaces have a positive effect on physical, social, emotional, and academic outcomes" (Mersand, 2020). In this study, Mersand related and analyzed the emotional outcomes of students through a semester-long makerspace course concluding the improvements in the student's self-efficacy and interest through the course. On the other hand, even though maker learning particularly involves scientific and technological knowledge, makerspaces also have the goal to develop crucial soft

skills like communication, teamwork, and collaboration. Similarly, makerspaces develop problem-solving and critical thinking skills that can help serve makers in the makerspace and in their future. Likewise, through the variety of resources and tools that makerspaces offer, makers are encouraged to use problem-solving processes by defining a problem, establishing solutions, analyzing those solutions, and implementing them (Bagassi & Macchi, 2020). Finally, makerspaces are designed to be easily accessible to their community and provide equal opportunities to their members to learn and innovate (Bagassi & Macchi, 2020).

2.2 Bringing a Makerspace to Bibliothek Buchs

2.2.1 Buchs, St. Gallen

The town of Buchs, pictured in Figure 4, is part of the Werdenberg district, located in the east region of the canton of St. Gallen, and with a population of 13,178 habitants and an area of 16 km^2 (as of 2021) Buchs is one of the largest urban centers in its region (Buchs SG, 2022). In terms of their economics, with 78.8% of their population, a vast majority works in the service sector while 16.6% and 4.6% work in the manufacturing and agriculture sector respectively. Buchs is also a remarkable educational center as being home of educational institutions like the Interstate University of Applied Sciences and the International School Rheintal. The interstate university of applied sciences offers undergraduate and graduate programs in a variety of engineering and business areas (Ostschweizer Fachhochschule, 2022). Similarly, the International School Rheintal offers their student International baccalaureate programs and is placed 9th amongst all IB schools in Switzerland (ISR, 2022).

Figure 4. Photo of the center of Buchs.

Note. Picture by Arturo Lemos

2.2.2 Bibliothek Buchs

Bibliothek Buchs is a library in the canton of St. Gallen, that is planning to expand knowledge through reading and doing (Projekt Bibliothek). It is a space where members can learn and further improve their knowledge, whether that is through the large inventory of books offered or the workshops provided to the members. Boasting an inventory of roughly 17,000 pieces of digital and analog media, Bibliothek Buchs pairs this large resource with a number of members upwards of 2,000 (Projekt Bibliothek). Members are quite active averaging 60 visitors to the library daily, and over 100,000 annual loans of digital and analog media (Projekt Bibliothek, Köppel, 2022).

Along with the book library is the toy library, Ludothek Werdenberg, where members are able to rent a large variety of toys and games for up to a month. The toy library offers members a variety of forms of entertainment from board games to bicycles. As of September 2022, there are 1,969 different games and play equipment to select from (Projekt Bibliothek). The toy library encourages all ages to play, with a quote by Oliver Wendell Holmes displayed on the website stating, "People don't stop playing because they grow old, they grow old because they stop playing!" (Holmes, 2020).

2.2.3 Bibliothek Buchs' Makerspace Vision

These two libraries will be partnering up in 2023 as they are moving to a new location together. In this new location, a roughly 25 to 50m^2 space has been reserved for the implementation of a makerspace (Köppel, 2022). In a meeting with the sponsor contact, the head of the makerspace project at the Buchs Library, Mr. Köppel pointed out that they have applied for funding from multiple towns in the area, and have confirmed funding from Werdenberg and St. Gallen (Köppel, 2022). This new location is already built, however, it is set to be renovated prior to Bibliothek Buchs' use. With renovations set to begin, this new location is scheduled to open in Spring of 2024 and be open to all members for 24 hours, seven days a week (Projekt Bibliothek). The layout in Figure 5 shows the planned new library location. This planned collaboration between Ludothek and Bibliothek presents a great opportunity for the two

organizations to create a centralized communal space for innovation.
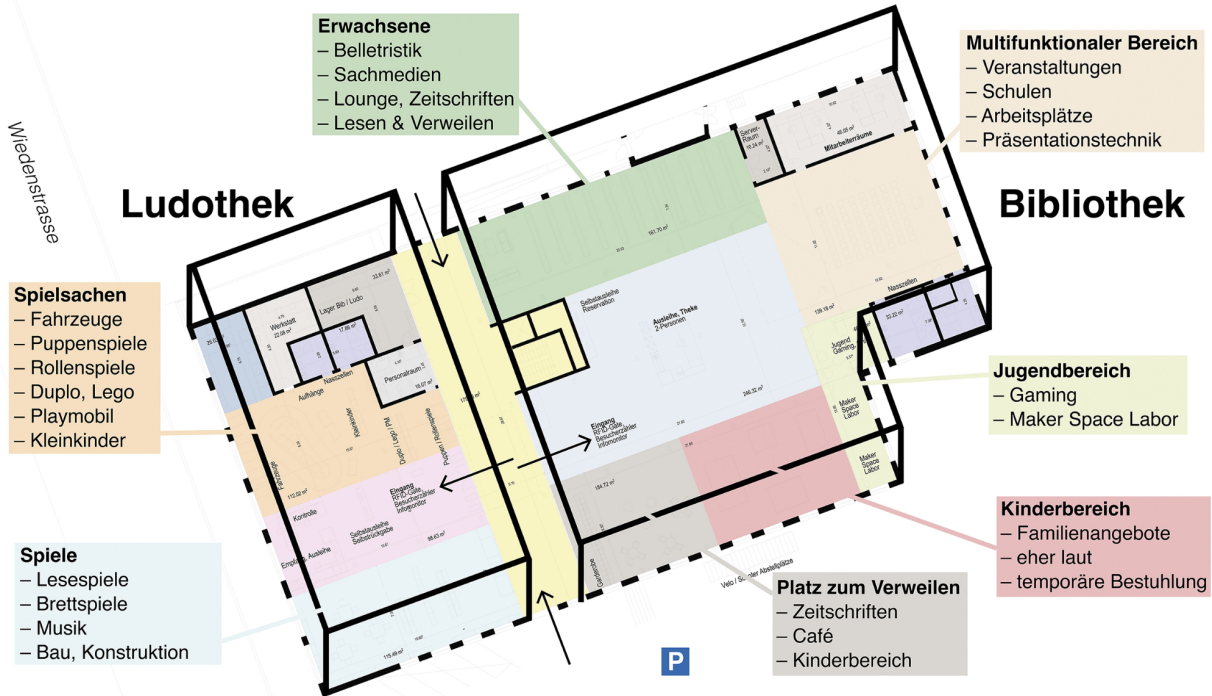
Figure 5. BiLuWe New Building Layout.

From *BiLuWe,* (https://biluwe.ch/). Used with the permission of Mr. Philipp Köppel, Head of the Makerspace project.

Makerspace collaboration with other educational institutions can help provide the adequate infrastructure and organization to create innovative and collaborative spaces. A common example of this is, as, in the case of our sponsor, a local library trying to expand its presence into STEM to better serve the changing needs of the community (Barrett 2018). This integration of library and makerspace works ideally as both provide a space where people can come to learn and innovate to advance their knowledge and understanding (Barrett 2018). Hands-on activities encourage intellectual freedom without being restrained by external suggestions (Barabash, 2019). The benefits of hands-on projects are a valuable part of education and can benefit creative thinking and problem solving.

The proposed design will include the appropriate tools to use in workshops along with recommendations of workshops based on community interviews and surveys. Tools might include: computers, 3D printers, hand tools, and other generally common materials that people might need. As well as equipment that the library already has, such as its six donated computers with linux and its electronics maker boxes (Köppel, 2022). Incorporating current materials in the

design with the new, the end results for the library will be an equipment list based on interest and cost, and a layout recommendation.

3.0 Methodology

In order to design the most effective makerspace for the community at Bibliothek Buchs library, we first established what resources would be most useful in their space in the new library. By connecting with community members who will be using the space, we were able to gain insight into what resources library members want access to. By gathering this information, community interest can be determined to provide a better focus for the makerspace. The equipment suggestions would prioritize resources at a level that is attractive to a large portion of the library members. The library would like to work with local leaders with expertise in technical areas who can help educate others through workshops and advising such as woodworkers or engineers. We also identified individuals who mentioned they were willing to run workshops to sustain learning at the makerspace after completion of the project.

The goal of this project is to create a design for a makerspace within the Buchs regional library to provide the community with a space containing resources and programming that can be used by all ages to create and innovate together.

Objectives:

1. Gauge interest from Bibliothek Buchs' community about makerspace topics
2. Identify makerspace best practices using currently operating makerspaces with similar interests
3. Develop a list of prioritized community interests using input from the wider library community
4. Finalize recommendations based on costs, available physical space, and community interest

These objectives will be completed through multiple rounds of interviews and confirmed with a survey. Each objective builds on previous objectives, going from general to more specific topics. Through these objectives, we were able to carefully coordinate the design of a makerspace that can be well integrated and versatile for the future of Bibliothek Buchs community.

3.1 Gathering Themes of Interest using Interviews

Our first objective focused on gauging the levels of understanding from the Buchs community about areas related to makerspaces. This information helped us to identify which domains that best fit the interests of the Buchs Library community. To accomplish this goal, we conducted a series of semi-structured interviews and used data coding to obtain categorized and comparable qualitative data.

3.1.1 Library Member Interviews

Our team conducted a series of semi-structured interviews with library members including follow up questions to allow members to share their ideas for a makerspace. A key point is age as part of the Buchs Library's objective is to create a space where children and adults alike are given the opportunity to develop and implement their own projects. Interviews consisted of first asking participants what their idea of a makerspace was. These were followed with several close-ended questions, with additional open-ended questions to clarify their answers (see Appendix E & D for our focus areas and questions). Participants were asked to provide their consent with our questions, after explaining the purpose of the interview (see Appendices B & C), with guardian consent being required for children. Our team worked with library staff to identify guardians and children of the library's daily visitors who might be interested in being interviewed about the makerspace. Utilizing the library's email list (see Appendix A), bulletin board, and social media page, we notified the community that we would be interviewing members September 6th and 7th, from 2:30 PM to 6:30 PM. Each interview included all four team members, two conducted the interview while two took notes, with library staff assisting with translation. Some of the largest issues we faced were interviewees not being familiar with the maker movement and issues with translating. We were able to conduct 14 interviews with library members, four with children and ten with adults. This more than met our data collection goal of four to six interviewees above and below 18 years old. We interviewed approximately 23% of the 60 members that visit the library daily, which is almost a quarter of the daily members represented ([Köppel, 2022](#)).

3.1.2 Interview Coding

Using the transcripts of our interviews, we used inductive coding (thematic analysis) to create a list of codes, which we applied to better develop an understanding of member themes of

interest. We noticed many interviewees shared areas of interest, most commonly Engineering/Robotics, Art, and Music. We used this data to identify the core areas that will need to focus on in our later objectives to research the interests of the Buchs community.

3.2 Developing Best Practices for Makerspace Design

Developing an understanding for the best practices in makerspaces can help us create a makerspace that runs smoothly and efficiently, based on lessons learned in similar projects. For our interviewing staff and organizers at various spaces in the city of Zurich and surrounding areas, we prepared questions on topics such as frequently used resources, workshops, and common types of projects that makerspace members work on. We emailed (see Appendix F) and scheduled interviews with these spaces, confirmed meetings, and conducted interviews and toured the facilities. In particular, we identified the equipment and set up of local makerspaces to establish a list of materials and equipment that are most popular at the respective locations. We analyzed the equipment overlap in spaces with the same or similar offerings. By identifying these practices through our research into this objective, we can better prioritize what is needed to make the makerspace as successful and enjoyable for the community to create their projects and further develop their knowledge. Our sponsor has also expressed interest in the uniqueness of this makerspace; ensuring that this place of project creation stands apart from other spaces.

3.2.1 Makerspace Interviews

Our data collection process during this objective consisted of semi-structured interviews with four expert makerspace officials and staff from local makerspaces in and around Zurich that share common interests identified in Objective 1. Something we were wary of in the makerspace interviewing process was the language barrier, so to aid this we came prepared with a German version of our interview questions and consent forms (Please see Appendix H and I). The makerspaces we interviewed were FabLab Zurich, Landquart Kinderlab, ETH Student Project House, and Brütwek, as well as an interview with a makerspace supplier Bischoff AG as seen in Table 1. In these expert interviews, we asked primarily open-ended questions based on our findings in our preliminary research, but we were also guided by the themes we generated in Objective 1 (Please see Appendix H for our focus areas and questions). We are working to get a more in-depth understanding of the inner workings of a makerspace to share back to our sponsors and to help us match our findings with the capabilities of the library. By asking questions such as "What are the more popular workshops," or "What projects do people get most

excited about," we learned more about what attracts people to certain spaces. Along with these questions, other areas of interest are maintenance costs, preferred equipment for certain projects, best value tools, layout concepts, and how they promote their space. Interviewees were informed of the purpose of our interview and asked to sign consent forms (see Appendix I) as well as gaining their permission to take pictures during the interview. We had two members of our team taking notes, and two engaging in the interview for each of the five locations we visited.

Makerspace Name	Location in Switzerland	Concentration
Bischoff AG	Wil, St Gallen	Makerspace supplier
Fablab Zurich	Zurich	Fabrication
Lanquart Kinderlab	Landquart, Graubunden	Engineering/Astronomy
ETH Student Project House	Zurich	Prototyping
Brutwerk	Buchs, St Gallen	Woodworking/Arts

Table 1. List of makerspaces contacted to request an interview.

3.2.2 Interest Equipment Correlation

Using the interests established in our member interviews, it made it easier to find common themes in the data collection from the makerspaces. From our notes and pictures from each interviewed makerspace, we created a list of equipment at each makerspace (see Appendix J). This list of equipment was correlated with interests from our library member interviews for later use in our survey. From the interview with a local makerspace Brütwerk, we also were able to see what equipment and materials are already being offered to the Buchs community. With this in mind, the younger age group that Brütwerk markets to, are provided with materials and workshops that do not need to be repeated.

3.3 Surveying Library Members

Through our member and makerspace interviews, we gathered knowledge of both the general topical interests of the community and the resources required to form a successful makerspace. Using this information, we constructed an online survey for a wider range of participants to rank the interest in topics and resources. This confirmation of interest was necessary to ensure our data was an accurate representation of the larger community.

3.3.1 Survey Construction

Using the collected interests in conjunction with workshop and resource suggestions from active makerspaces, we created a structured survey designed to rank interest in common themes and resources. WPI Licensed Qualtrics provides a secure platform that can be used to digitally poll library members, so each respondent was informed of what the survey was to be used for and asked for their consent (see Appendix L). We asked if the surveyee would be interested in a collaborative space for project creation in order to gain a community interest in the space as a whole. Survey questions also asked respondents to rank 6 different topics by their interest in the subject along with their interest in 9 different types of equipment. Along with these questions we requested the age range of the surveyee to give more context along with aiding the design of workshops in the future. These questions were closed-ended to allow for a statistical ranking of the topics that receive the highest rankings and interest (see Appendix M). With help of our sponsor we translated the survey to German to allow all members of the community to give their responses. The surveys were distributed through Bibliothek Buchs' mailing list and QR codes posted in the library itself (see Appendix K). Our goal was to establish a statistically valid survey with 30 participants which we exceeded with 56 responses.

3.4 Creating a Final Recommendation for Bibliothek Buchs

Taking the information gathered from our survey, we performed a standard analysis based on Qualtrics cross tab files to filter and group together community interests in a ranked list. With the ranked interests, we were able to create a sample layout plan along with a ranked equipment list. Information collected on interest in makerspaces were compared with equipment and resources for makerspace operation from makerspace interviews to create groupings of topics to the tools they require. The top ranked topics of interest and resources from this data were prioritized as more important parts of the makerspace to provide the community with the most popular subjects and resources.

3.4.1 Current Library Equipment

As Bibliothek Buchs does not currently have a final budget for the makerspace, we decided the best recommendation we could provide is a ranked list of equipment so they can adapt the makerspace to fit their budget. Apart from an understanding of their funds and priorities, we assessed the current tools and materials the Buchs Library already owns to reuse and reduce the need for new items. Particularly, the library already owns six computers that can be used for the makerspace to run software. There are also current workshop materials being rented from companies and purchased by Mr. Köppel. As seen in Figure 6, the library has workshops in the form of maker boxes which is a prototype to be used in the new makerspace. The new makerspace plans to use this electronics maker box to be rented out to library members for at home use as well as in the makerspace area. We also reached out to Bischoff AG inquiring about partnering with the library to supply equipment and materials for the makerspace.

Figure 6. Makerspace Box. Mr. Köppel currently has these electronics boxes with an arduino, moisture sensor, ultrasonic sensor, temperature and air humidity sensor, digital display, breadboard, cables, knobs, and LEDs.

3.4.2 Finalized List of Recommendations

From the entire data collection process we gathered enough information to make an informed recommendation for the makerspace. We know the budget the library has to purchase new equipment, we have an ordered list of community interests in topics and resources, and we know the floor plan of the new space. By weighing these variables we created a formal recommendation for a makerspace that best balances the resources the community wants to use with what will have the most longevity and fit into the new space. We were able to provide a recommendation, however, factors can and likely will change in the time from when we created our recommendation and when it will be put to use. To mitigate any issues that may occur, we provided the thought process behind our actions so that modifications can be made to our original proposal to fit the new needs. We hope this recommendation creates a great guideline that allows the makerspace to be enjoyed by all members of the community.

4.0 Findings and Analysis

4.1 Library Member Interest Findings for Workshop Development

4.1.1 Member Interviews

Utilizing Bibliothek Buchs newsletter and mailing list (see Appendix A) , members were invited to come and be interviewed on Tuesday 09/06/2022 and Wednesday 09/07/2022 from 2:30-6:30. Each interview consisted of semi-structured questions which gave the interviewees the chance to put forth their own thoughts while still maintaining a structure to gauge interest about traditional makerspace focuses. We gathered interview responses from a total of 14 interviewees, 10 who were over 18 and 4 who were under 18. From our interviews we found a strong trend in favor of hands-on learning with 100% of adults interviewed being in favor of project-based learning. In addition, 70% of adults rank creativity as the most valuable aspect of learning. This information establishes Bibliothek Buchs as a community that values creativity and non-traditional learning, creating an excellent set of values for a makerspace. All interviewees were also questioned on their favorite school subject, past or present, where 36% of them answered Arts and Crafts, and 29% of them answered Mathematics. In total, 65% of interview subjects answered either Math or Arts and Crafts, which means projects and tools in the makerspace that correlate to these areas might be used frequently. The total response distribution can be seen in Figure 7.
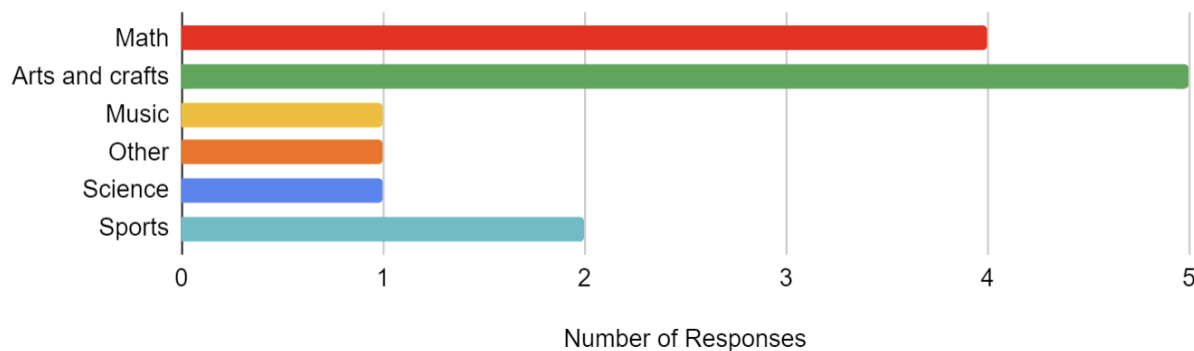
Figure 7. Interview responses for favorite school subject

Participants also chose their top three areas of interest from a preselected list of eight interests. This interest data was used by us to identify makerspaces with similar areas of interest, to then research which tools and equipment they use. As seen in Figure 8, engineering/robotics

was a leading interest, meaning members might respond well to a workshop with a design challenge to build a robot for a specific task.

Interview: Areas of Interest
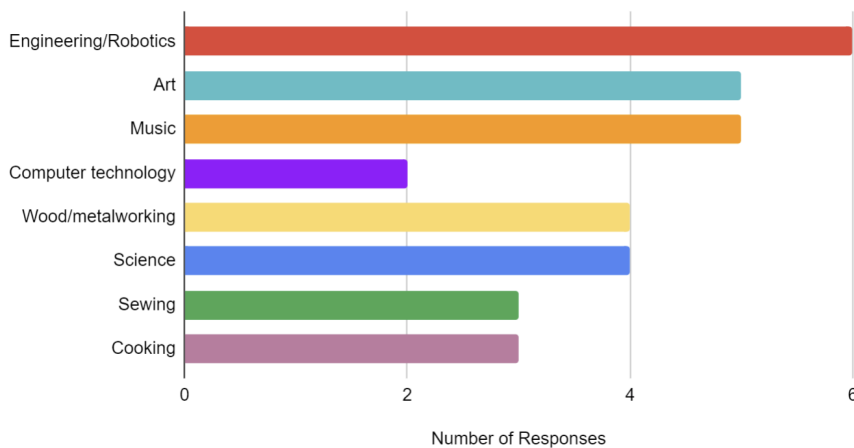
Figure 8. Top areas of interest from interviews.

Art and music were tied for interest next, meaning a majority of interviewees are interested in engineering/robotics, art, music, or a combination. A workshop with a focus on the integration of art/music with engineering, such as a dancing robot or drawing robot, might be well received within the community. Workshops that include multiple areas of interest would likely perform better in general than single-area workshops, as members who might not be as interested in one area might attend. If a workshop was held on chocolate molding using 3D printed molds, it might interest members who like cooking, and members who like engineering. These hybrid style workshops can help members explore areas that they might not initially be interested in but are more engaged by when it contains elements of a familiar area.

4.1.2 Member Survey

Through use of Bibliothek Buchs' newsletter and QR codes at the library itself we were able to send out our interest survey on Friday 9/30. We closed the survey Friday 10/7 after amassing 62 total responses. In this survey we asked 4 questions the first of which asked if the surveyee was interested in a collaborative space used for creating projects and learning new skills. Of the 58 people to respond to the question, 70% were interested in such a space, demonstrating the space will have a strong attendance from the community as shown in Figure 9.

#	Field		Choice Count
1	Yes	70.69%	41
2	No	29.31%	17
			58
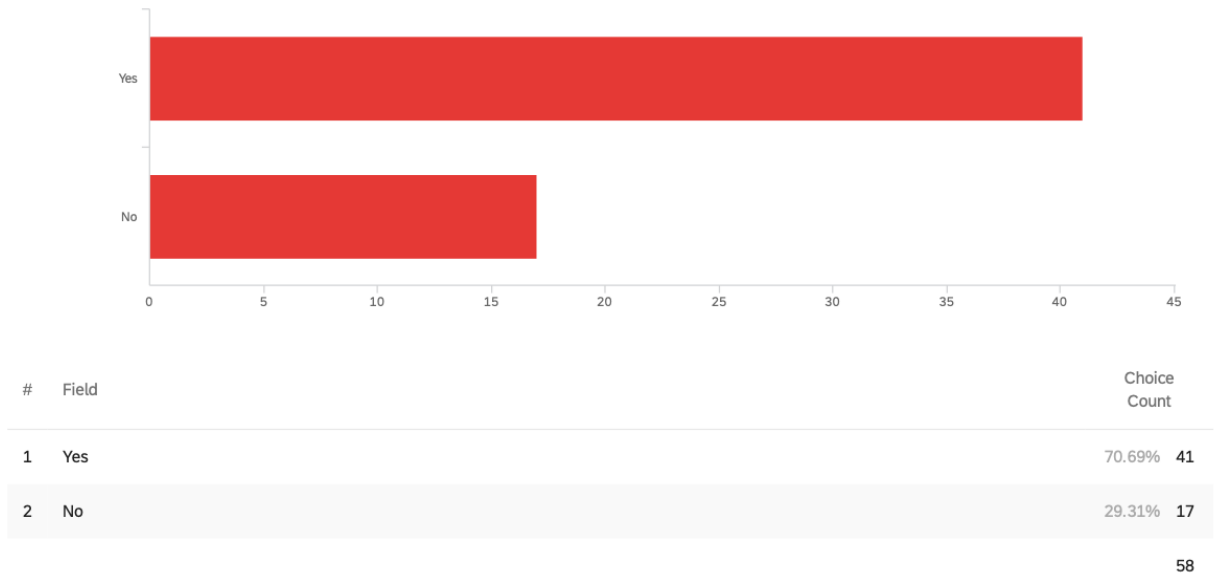
Figure 9. Chart of all responses to "Are you interested in a collaborative space used for creating projects and learning new skills?"

Next, we asked patrons to sort topics from most to least interest. The question format used a drag and drop, with our interest list items determined from our initial interviews:

- Engineering / Robotics
- Arts
- Sciences
- Wood / Metal Working
- Music
- Computer Science

Rankings for each placement are shown in Table 2, 1 is ranked as being most interested and 6 the least interested. For the number one ranking, 14 patrons (26%) ranked arts as the topic that they were most interested in, while 11 (21%) patrons had engineering and robotics as their most interesting topic. On the other end, 21 patrons (40%) ranked computer science as least interested in sixth place. Engineering and robotics also received 12 votes, and 8 patrons ranked arts in sixth place. This survey data shows that the topic of most interest was arts, followed by engineering and robotics; however, both of these topics also were ranked least interesting by many members. Additionally, the survey data shows that computer science was the topic of least interest to this pool, which aligns with our initial interview data. Engineering and robotics in addition to art were also key points of community interest in interviews.

Area	1	2	3	4	5	6
Arts	14 (26.42%)	10 (18.87%)	12 (22.64%)	5 (9.43%)	4 (7.55%)	8 (15.9%)
Engineering / Robotics	11 (20.75%)	7 (13.21%)	4 (7.55%)	10 (18.87%)	9 (16.98%)	12 (22.64%)
Sciences	9 (16.98%)	7 (13.21%)	12 (22.64%)	14 (26.42%)	10 (18.87%)	1 (1.87%)
Wood / Metal Working	8 (15.09%)	10 (18.87%)	10 (18.87%)	14 (26.42%)	6 (11.32%)	5 (9.43%)
Music	8 (15.09%)	15 (28.3%)	8 (15.09%)	5 (9.43%)	11 (20.75%)	6 (11.32%)
Computer Science	3 (5.66%)	4 (7.55%)	7 (13.21%)	5 (9.43%)	13 (24.53%)	21 (39.62%)

Table 2. Topic Interest Rankings Frequency from First to Sixth place. Survey Question: "Please sort your interest in these topics, 1 being most interested and 6 being least interested (Drag and drop)."

The third survey question asked patrons to choose "not interested", "interested", or "interested in attending a workshop to learn" for different tools. The resources to rank were:

- 3D printers
- Laser cutters
- Sewing equipment
- Woodworking/ hand tools
- Microcontrollers and electronics
- Photo Editing Software
- CAD
- Computer programming
- Robotics

As shown in Figure 10, the x-axis shows the number of respondents, and the y-axis shows whether they selected interested, not interested, and or interested in attending a workshop. From the 55 responses we found a highest total interest in handtools and photo editing software, although there was far more interest in learning photo editing software as it had the second highest interest in attending a workshop out of all the resources. The most interest in a workshop was on 3D printers with 21 members being interested. However, woodworking/hand tools, which had the largest interest category, had the second lowest interest to learn through a workshop, meaning the community wants them as a resource but feels comfortable with them already. There was also a strong disinterest in many computer related resources other than photo editing software, as the four resources with the most non-interest were CAD, computer programming, robotics, and microcontrollers and electronics. All of these resources had over 60% of patrons choose not interested while no other resource had more than 50% disinterest. Another notable interest was the laser cutter which ranked third in a resource the community would be willing to

attend a workshop to learn about.
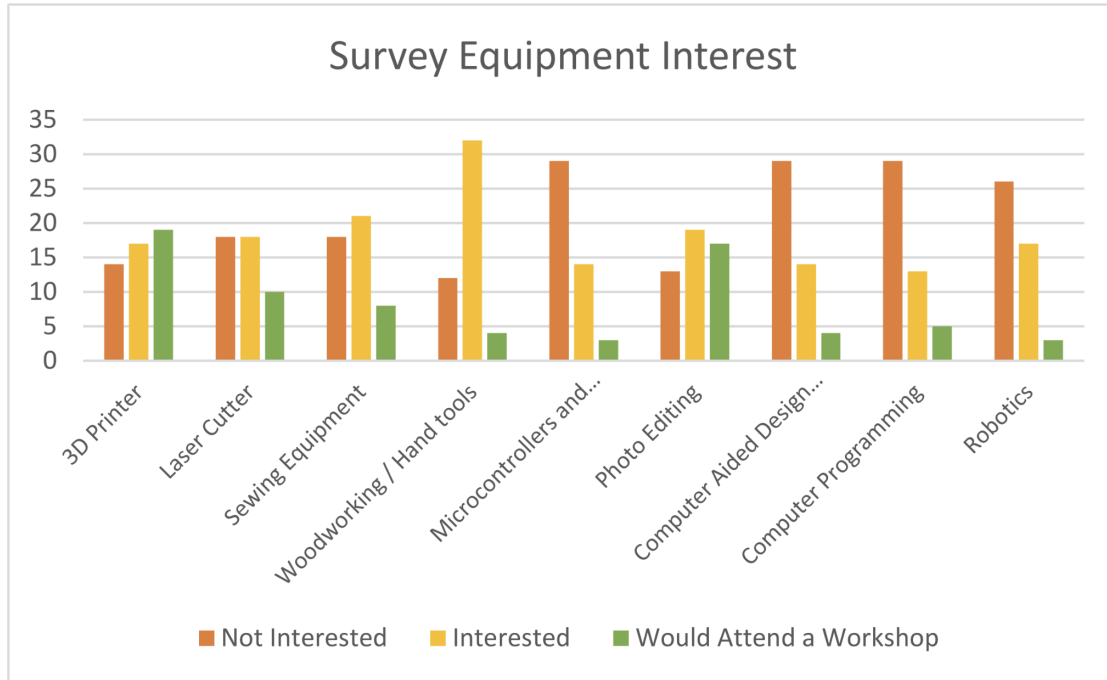
Figure 10. Resource Interest Rankings. Survey Question: "Which of the following equipment / computer programs would you be interested in using to create your own projects?"

Finally, question four asked patrons "For us to best design workshops, how old are you?". As seen in Figure 11, a chart of the age distribution of each patron who took our survey; x-axis showing the number of patrons and y-axis showing the age ranges. With the Qualtrics data results, percentages are shown in the figure with ten patrons who are under 14 years old, 38 patrons between 18 and 65 years old, and nine patrons over 65 years old. With a total of 56 patrons who took the Makerspace Interest Survey, which shows the trend that most of the respondents are adults. This may be skewed due to how our survey was distributed; through the email alias of library members (see Appendix K) as well as a QR code at the front desk of the library.
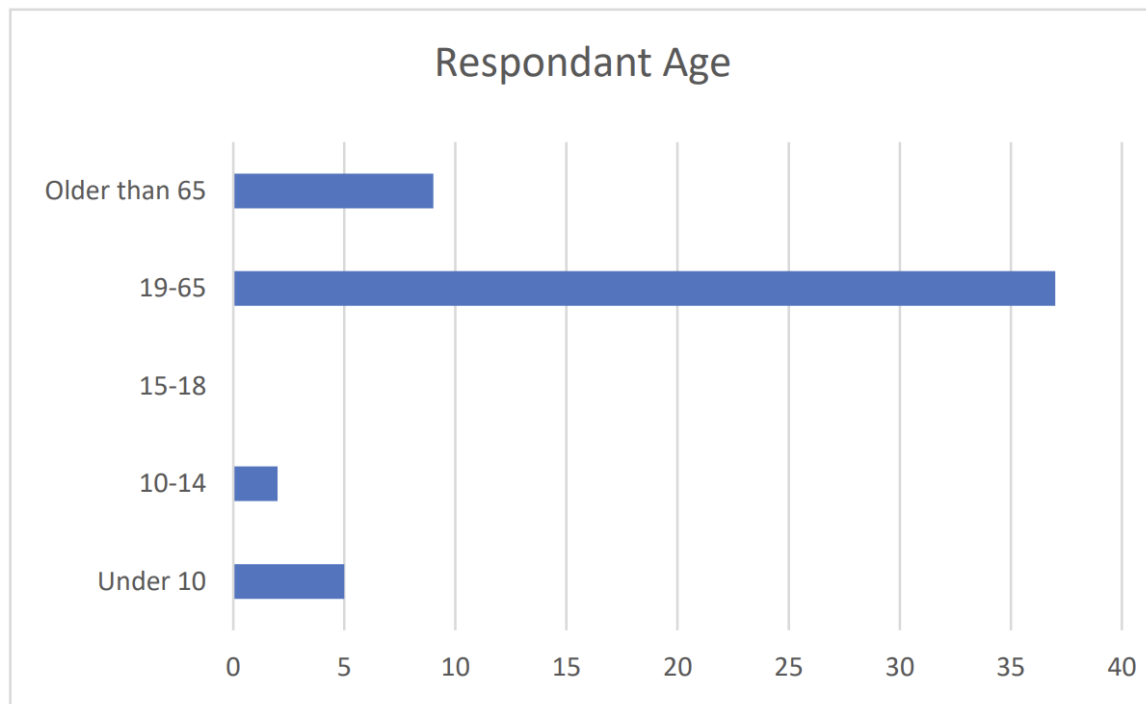
Figure 11. Age breakdown of surveyees

Additionally, Qualtrics allows us to filter the answers of our survey using the age of the respondents. This is important for our sponsor, because the interests differ so the adults and the children will have different workshops.

4.2 Makerspace Design Proposal

4.2.1 Makerspace Tools and Areas

Makerspaces have a wide range of tools, part of our proposal will be deciding which tools a makerspace can have are most important. Bischoff AG, a school and office product supplier, also supplies makerspace equipment and technical support to spaces across Switzerland. This company is located in Wil, roughly an hour from Buchs. A main focus of the company is to provide equipment to allow people to learn through exploration while keeping these products renewable and minimizing waste. An interesting product was the Electro-fashion, a textile thread that carried an electrical current allowing it to be sewn into fabrics allowing students to create

projects such as a fabric owl with sewn-in LED eyes (shown in Figure 12) that acts as a good bridge for students interested in either electronics or sewing.

Figure 12. A demonstration of the sewn owl using the Electro-fashion product

They also offer machines including 3D printers, form boxes, and laser cutters such as the X-tool M1. A very good 3D printer that was recommended to us was the Prusa i3 MK3S+ (as shown in Figure 13) as it is sourced from the Czech Republic, at 1200 Euros, and can be repaired using 3D printed parts allowing easier maintenance. Additionally Bischoff AG sells filament and as of 2022 is working with 3D printer manufacturers to create a program where spaces can send scrapped builds to be recycled into new filament which only adds to their focus on renewability.

Figure 13. A demonstration of the The Prusa i3 MK3S+

Another great aspect of this company is their rental services for consumers that were testing the engagement triggered by certain products. One of the products you can rent is the "making on wheels" in which the "basic" set can be rented for 600 CHF in six month intervals. It is a rolling cart including three busbars, a tripod mount, and 10 boxes which each include kits for 20 students. These kits have motors, buttons, switches, jump wires, cables with crocodile clamps, potentiometers, propellers, and a total of 400 LEDs. There are different packages of the making on wheels set such as the Ultimate, which adds on a 3D printer with filament and a variety of gears, axles, threaded rods, screws and nuts, wheels, and motors, although these upgrades are costly.

Item	Interests Addressed	Target Users
Cardboard cutting kit	Creative exploration	Beginner, kids
Prusa MK3S+	3D printing, creative exploration	Beginner through advanced

Making-on-wheels kit	Electronics, creative exploration	Beginner through advanced
X-tool M1	Laser Cutting, Creative exploration	Intermediate to advanced
Form Boxes	Science, Art	Beginner through advanced
Electro-fashion Thread	Sewing, Electronics	Beginner, Kids
Microcontrollers (Arduinos, Calliopes, Raspberry Pis)	Electronics, Robotics, Computer science, Creative exploration	Intermediate to advanced

Table 3. Notable products offered by Bischoff AG

Bischoff AG sources their products from around Europe making them much easier to repair and receive parts as part of their focus on longevity and renewability. Bischoff AG puts great emphasis on this and works with customers to provide repairs even after the two year warranty alongside training users in order to maximize the lifetime of their products. With their close proximity to Buchs and a purpose mirroring the Buchs Bibliothek, Bischoff AG would be a great supplier for the makerspace.

Over the course of two weeks, the FabLab, Landquart Kinderlab, ETH makerspace, Brütwerk makerspace in Switzerland were interviewed and toured for their unique equipment offerings. The most consistently recommended equipment from these four makerspaces was 3D printers, hand tools, and sewing equipment. Other common materials found in these spaces were: laser cutters, microcontrollers, woodworking materials, and craft materials such as cardboard, plastic, paint. The FabLab in Zurich, offers equipment for a large age range. Each makerspace offers their own instructional classes on how to use equipment, as well as project classes. Landquart Kinderlab, Brütwerk, ETH have a catalog of materials and workshops on their respective websites, as well as manuals for creating previously offered projects. For example, the ETH makerspace has a website where students can sign up online to book a slot in a workshop. This aids workshop leaders in purchasing the correct number of materials and gauging interest in the workshop. As well as there are online programming courses on their website that students can complete at home. The equipment at these makerspaces are specific to the community they

provide for, based on age range and interest. In the same town as our sponsor, the Brütwerk makerspace is temporarily in the same space as the Setzchaschte makerspace. The Brütwerk makerspace offers its space and workshops for children nine years and up, and the Setzchaschte makerspace offers for two years and up. This shared makerspace offers workshops in woodworking, crafts, and painting and targets the younger age range. It is set up in a large open room where kids are able to move around the multiple project areas and easily be supervised. To avoid an overlap of resources in the Buchs area, the library's makerspace design will reflect the gap of interests provided in the community.

Makerspace	Age focus	Size	Membership price	Unique characteristics	Workshops frequency	Funding
Kinderlab	6-13	Small	50 CHF/year	School workshops	6-12/month	Annual membership and 10 sponsors
Student Project House	Higher education students (around 17-28)	Big	Free for ETH students(not open to public)	Project advising, and coaching	12-20/month	ETH university and 17 sponsors
Fablab Zurich	All Ages	Medium	156 CHF/year	"Freefab" or material costs support	3-8/month	Annual membership fees
Brutwerk	Secondary students (around 9-16)	Medium	Free to La nave students(only)		3-5/month	Public school "La nave"

Table 4. Comparison between the makerspace's interviews data.

4.2.2 Budget Prioritization Analysis

The final part of our findings is a budget prioritization. Possible makerspace equipment was ranked by the total cost to interest ratio for prioritization. As Bibliothek Buchs does not have a finalized budget for the makerspace area, this prioritization of equipment for purchase allows

them to adapt their budget later on. Equipment costs do not account for computers, as Bibliothek Buchs currently has six computers set aside for the makerspace and only software must be purchased. Costs for furniture like workbenches, storage, chairs, and decorations are not considered as they will be added when remodeling the new location. Using the tools identified in section 4.2.1, we created Table 5: which details the specific tools available in each area of focus. Each equipment area has different costs associated with it, these costs are based on prices in October 2022 sourced from the listed supplier. Some computer software like "Computer Programming" and "Computer Aided Design" have open source software that can be used for free.

Equipment	Description	Price	Supplier
Computer Programming	Programming IDE for various languages	0 CHF	Open Source Software
Photo Editing Software	Affinity Photo Editor	50 CHF	Affinity
Sewing Equipment	Needles, thread, and electronic textiles kit	50 CHF*	Bischoff AG
Computer Aided Design (CAD)	FreeCAD, open source CAD software	0 CHF	FreeCAD
Woodworking / Hand tools	Hand tools for small woodworking projects	100 CHF*	Bischoff AG Local Hardware Store
3D Printer	Prusa i3 MK3S+, not including filament	1,200 CHF	Bischoff AG
Robotics	Ozobot EVO	200 CHF	Bischoff AG
Microcontrollers and Electronics	Making to go Calliope/Arduino	125 CHF	Bischoff AG
Laser Cutter	xTool M1 by Makeblock Education Bundle, laser cutter	2,200 CHF	Bischoff AG

Table 5. Equipment descriptions, what tools for each equipment area. *non specific resource, estimated cost.

In order to provide an equipment recommendation that best fits the library member's interest in the most cost effective way we analyzed the cost to interest ratio. The cost to interest

ratio is the total cost (number of kits $\times$ cost per kit) divided by the total interest (interest + workshop interest). The amount of kits was determined by the amount of equipment needed to run a workshop as estimated by Mr. Köppel. As seen in Table 5, the Cost/Interest Ratio is used to order our recommendation; the lower the ratio the higher the value of the equipment. Using a ranked list allows Bibliothek Buchs to dynamically adapt their makerspace to fit their budget. Some computer software, like computer programming and computer aided design (CAD), have a zero cost to interest ratio because they do not cost the library anything. The 3D printer and Photo Editing Software both had similar interest levels; however, the high cost of the 3D Printer at 1,200 CHF puts it lower on the list of priority equipment with a cost to interest ratio of 30.77. Finally, the laser cutter had the highest cost to interest ratio, due to its high cost of 2,200 CHF from Bischoff's website.

Equipment	Not interested	Interested	Interested in a Workshop	Interest Percentage	Cost per Kit	Kits Needed	Total Cost	Cost/Interest Ratio
Computer Programming	30	13	6	38.78%	CHF 0.00	6	0.00 CHF	0
Computer Aided Design (CAD)	31	14	5	38.00%	CHF 0.00	6	0.00 CHF	0
Photo Editing Software	14	20	17	72.55%	CHF 50.00	6	300.00 CHF	8.11
Sewing Equipment	19	23	8	62.00%	CHF 50.00	6	300.00 CHF	9.68
Woodworking / Hand tools	14	33	4	72.55%	CHF 100.00	6	600.00 CHF	16.22
3D Printer	15	20	19	72.22%	CHF 1,200.00	1	1,200.00 CHF	30.77
Robotics	26	19	4	46.94%	CHF 200.00	4	800.00 CHF	34.78
Microcontrollers and Electronics	30	16	3	38.78%	CHF 125.00	6	750.00 CHF	39.47
Laser Cutter	18	21	10	63.27%	CHF 2,200.00	1	2,200.00 CHF	70.97

Table 6. Order of Suggested Budgeted Equipment and Materials.

Note. "Interest Percentage" is the total "Interested" and the "Interested in a Workshop" divided by the total respondents. "Cost per Kit" was based on prices from the Bischoff supplier website. "Kits Needed" were determined based on interest and baseline need for use. "Total Cost" was based on "Cost per Kit" and "Interest" and "Interested in a Workshop". "Cost/Interest Ratio" was from "Cost per Kit" divided by the total "Interested" added to "Interested in a Workshop".

Pricing adapted from Bischoff. (Bischoff 2022).

5.0 Conclusion

Suggested List of Equipment

A list of equipment in order of interest as well as cost effectiveness was developed in Table 6. From this table, and considering the space available, we were able to determine a rough

budget of 7,000 CHF. This is to incorporate everything in Table 6 sourced from Bischoff AG, along with initial resources. This list will serve as a guide for Mr. Köppel and the library to know what the library members' interests are, as well as see where to source the equipment. Using the projected cost list, Mr. Köppel can provide donors and sponsors with a theoretical cost for the makerspace. In the proposed equipment layout, we combined the current equipment the library has with the equipment in our recommended list.

Sample Makerspace Floor Plan

Findings from our methodology enabled the creation of a sample makerspace floor plan that takes in consideration the equipment and workshop interests of library members. From our makerspace interviews and visits, we found organization and accessibility to be critical aspects in a makerspace design to facilitate workflow and safety. For that reason, we separated our layout into different work and equipment areas. As seen in Figure 14, we used our survey results to assign a corresponding dimension to each of the makerspace areas depending on the libraries' members interest. As an example, woodworking or arts/craft areas have a larger size in comparison with the 3D printer or laser cutter area. Also, according to our sponsor's information, the makerspace will have 6 computers that will be located in the computer lab area. In terms of the overall size, we design this space to have a projected maximum capacity of 12 people. This is based on space requirements and includes 6 members using the computer area, while six are able to use the project space. To facilitate makers' progress and project flow, we assigned a storage area where makers can store their unfinished projects. This area would ideally have shelves and under table storage to maximize the storage capacity. Shelves and displays around the room may also be used to display completed projects and inspire other makers. A collaboration zone in the middle of the makerspace would allow workshops to be run in the space along with providing members with a central area to share and improve their projects with others.
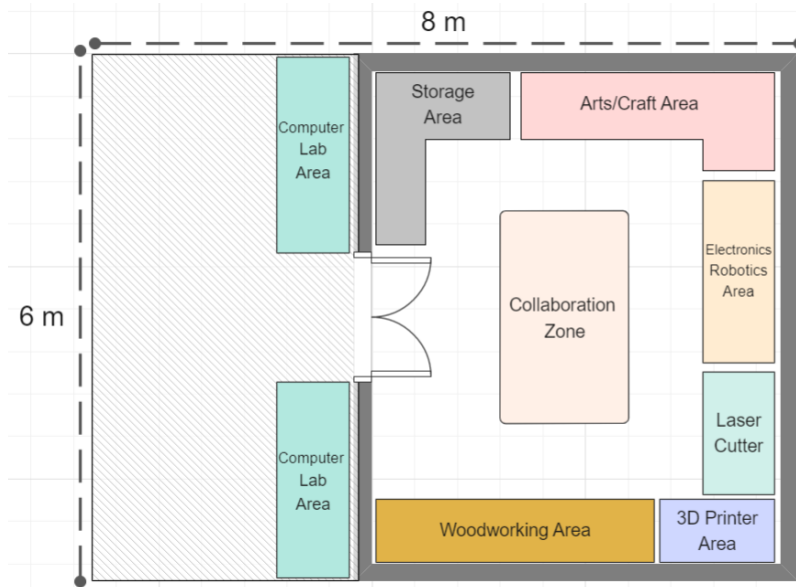
Figure 14. Sample Makerspace Floor Plan

Limitations

The library was still in the early stages of planning its new space, which led to limitations in what project goals we could take on. From the broad idea of designing a makerspace, we worked with our sponsor to narrow our focus which at times posed challenges. Developing specific workshop ideas was outside of our ability, but we were able to put together a list of recommended equipment alongside the sample floor plan.

We aimed to avoid encroaching on the scope of surrounding spaces that have already been established. For example, across the street from the current location of Bibliothek Buchs is a music school so despite high interest in music as a subject, we were limited in the resources we could use without mirroring what they already do. Another space we had to be conscious about when designing a plan for the space was Brütwerk as they are an arts and crafts creation space 15 minutes from Bibliothek Buchs. Due to the high interest in arts, it was a challenge to provide the community with resources for arts while keeping the libraries own identity and not replicating Brütwerk's. We worked through these issues by keeping a more general view on arts while also exploring other topics. Along with this we look to work with the other companies on workshops and with resources.

Due to the space being in such early stages of development, throughout the project a working budget was never finalized. Due to this we were unable to delve into equipment outside of Bischoff. Since we were unable to build an inventory, a set design for the layout wasn't able to

be constructed. Instead, we gave a recommendation of a layout and a budget estimation to the library for them to use in proposals to future donors as an estimation of the cost required for this space.

Along with no set budget, due to the nature of Bibliothek Buchs' move to a location that is being newly renovated, there have been several floor plan changes. Initially we were to work with a narrow 25 square meter space that can be seen in Figure 15 labeled as "Jugendbereich". Following this we were given the current central location of the space labeled "Makerspace area" in Figure 15. However, despite having the location, we were informed the space will be between 25 and 50 square meters so we had to give our best estimate of likely dimensions. From this we chose 6m x 8m, giving a total area of 48 square meters, that being said as this is an estimate it is subject to change. Without an accurate representation of the floorplan, our ability to give a set floor plan was limited; as we could not use exact measurements for tables or machines to make a complete space. Instead we had to make everything theoretical with the expectation of further change.

Figure 15. Current floor plan with proposed makerspace placement

One of the main concerns during our discussion about the implementation of the woodworking area in our floor layout was the noise. Since the makerspace area was moved to the center of the new library's floor plan, it was needed to take further attention in terms of safety, noise, or any other factors that could negatively impact other library member's experiences. For this reason, power tools, such as drills or table saws, are not part of our

equipment recommendations. However, the laser cutter area could assist in many lighter projects in place of power tools.

Future Work on the Makerspace

With this suggestion of equipment for purchase as well as the floorplan, we look forward to seeing how the makerspace evolves. Future steps in workshop development, budget finalization, as well as funding can all be worked through.

Making use of different digital marketing platforms would benefit the expansion of the library's audience of the space outside of the current library members. Currently, Bibliothek Buchs uses their website to promote makerspace workshops led by Mr. Köppel. With the positive results from this website, we consider that creating exclusive digital platforms for the makerspace would improve its audience reach in the maker community. As an example, creating a website and making use of social media platforms would improve the promotion of events and inspire the maker audience with the latest projects done in the space.

In addition, this website accumulating past makerspace workshops could also include a list of future workshop ideas and who will lead them. This will then become a reference for Mr. Köppel to use when planning for workshops. From our initial interviews, a few library members expressed interest in teaching workshops in the library's new space. Contacting these members will be beneficial to ensure that Mr. Köppel is not the only one leading workshops. Within these workshops, we hope the interests we were unable to incorporate within our suggested floor plan and budgeted equipment will be tied in. For example, music has been a popular theme of interest from our initial interviews and confirmed in our survey findings. This may be addressed through music software, which can be from an open source, to each of the six computers that the library already has or budgeting for midi keyboards for library members. Another solution may be to collaborate with other local institutions that can bring beneficial educational opportunities to the Buchs community. Across the street from the current location of the library is a music school, which could lead to a potential collaboration to work in the music interest that library members have. This may be in the form of the school holding workshops at the new library's makerspace. Partnering with local schools, makerspace or universities can improve the educational value and audience of workshops and events. As an example, the head of the Brütwerk makerspace shared his interest in working together with our makerspace during our interview. Since the Brütwerk's makerspace concentration is focused on art and woodworking, collaborations in those areas would allow for members of the library to pursue larger scale projects in these areas.

We hope that our equipment list and budget proposal will enable Bibliothek Buchs to collect potential sponsors and donors. A mix of local public and private institutions would be ideal to maximize funding from different sectors. A diversified example of sponsors would be the St. Gallen Canton, SIEMENS, and the Interstate University of Technology in Buchs.

We hope these recommendations will assist the development of this makerspace during its construction in spring of 2024. Also, we hope that the future work section of this report will guide and inspire Mr. Köppel and future team members on the makerspace project. Finally, we

hope that the Buchs community will take advantage of this space to pursue their interests as well as discover and develop new ones while they work and learn together.

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Appendices

Appendix A. Email Sent Through Bibliothek Buchs Newsletter about Semi-structured Member Interviews (English and German Translation)

Hello All,

We are a team of college students from the United States working here in Switzerland with Bibliothek Buchs. Our purpose is to plan a space where the community in Buchs can create their own projects and expand their interests. The library is designing this area called a "makerspace" for their new library location.

We're reaching out to find interested community members of a range of ages to interview in order to gauge interest in project themes for this unique area.

Our team plans to be in the library from 14:30 to 18:30 Tuesday and Wednesday, if you're interested please reach out to Mr. Köppel and our team's email gr-zuricha22-makerspace@wpi.edu or just stop by the library!

We're looking forward to hearing from you!
Makerspace Team

Hallo zusammen,

Wir sind ein Team von College-Studenten aus den Vereinigten Staaten, die hier in der Schweiz mit der Bibliothek Buchs zusammenarbeiten. Unser Ziel ist es, einen Raum zu gestalten, wo kreative Bastler:innen, Tüftler:innen und Hacker:innen aus Buchs und Umgebung ihre eigenen Projekte entwickeln und ihre Interessen erweitern können. Die Bibliothek Buchs plant dazu für ihren neuen Standort einen sogenannten "Makerspace".

Wir sind auf der Suche nach interessierten Personen verschiedener Altersgruppen, die wir befragen möchten, um herauszufinden, welche Projektthemen in der Region von Interesse sind.

Unser Team plant, am nächsten Dienstag 6. 9. und Mittwoch 7. 9. von 14:30 bis 18:30 Uhr in der Bibliothek zu sein. Wenn Sie Interesse haben, wenden Sie sich bitte an Herrn Köppel und an das Team über die E-Mail-Adresse gr-zuricha22-makerspace@wpi.edu oder kommen Sie einfach in der Bibliothek vorbei!

Wir freuen uns darauf, von euch zu hören!

Makerspace-Team

Appendix B: General Consent Form for Interviews: Gather Themes of Interests from the Community (English and German Translation)

Adapted from sample material (Theofilou 55-79).

As a part of our college project at Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We hope that our planning will result in a well designed space where the community can learn and create projects.

We would like to ask you a list of questions of different topic areas of interest, such as arts, engineering, and music, as well as any follow-up questions we have to clarify your interests. We would also like to take notes during this interview. No risks are associated with these questions and you may choose to not participate, skip questions, or withdraw at any time. Your permission is required in order for you to participate.

We will use this information to establish the common interest in creative subject areas among this age group of 18 and over.

Our hope is that by taking part in this interview you will be able to create projects in the new library's makerspace that fit your interests! Feel free to contact us at gr-zuricha22-makerspace@wpi.edu with any questions that you may have. Thank you for your time.

Sincerely,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Name: _____

_____ _____
Date Signature

Angepasst an das Beispielmaterial (Theofilou 55-79).

Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute arbeiten wir mit der Bibliothek Buchs zusammen, um einen Plan für den Makerspace an ihrem neuen Standort zu

entwickeln. Wir hoffen, dass unsere Planung zu einem gut gestalteten Raum führen wird, in dem die Gemeinschaft lernen und Projekte erstellen kann.

Wir möchten Ihnen eine Liste von Fragen zu verschiedenen Themenbereichen stellen, die Sie interessieren, z. B. Kunst, Technik und Musik, sowie weitere Fragen stellen, um Ihre Interessen zu klären. Außerdem möchten wir uns während dieses Gesprächs Notizen machen. Diese Fragen sind mit keinerlei Risiken verbunden, und Sie können sich jederzeit entscheiden, nicht teilzunehmen, Fragen auszulassen oder sich zurückzuziehen. Ihre Zustimmung ist Voraussetzung für die Teilnahme.

Wir werden diese Informationen nutzen, um das gemeinsame Interesse an kreativen Themenbereichen in dieser Altersgruppe ab 18 Jahren zu ermitteln.

Wir hoffen, dass Sie durch die Teilnahme an dieser Befragung in der Lage sind, im Makerspace der neuen Bibliothek Projekte zu realisieren, die Ihren Interessen entsprechen! Wenn Sie Fragen haben, können Sie sich gerne an gr-zuricha22-makerspace@wpi.edu wenden. Wir danken Ihnen für Ihre Zeit.

Mit freundlichen Grüßen,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Name: _____

_____ _____
Datum Unterschrift

Appendix C: Child Consent Form for Interviews: Gather Themes of Interests from the Community (English and German Translation)

Adapted from sample material (Theofilou 78,79).

Dear Parent and / or Guardian,
As a part of our college project at Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We hope that our planning will result in a well designed space where the community can learn and create projects.

We would like to ask your child a list of questions on their opinion of different topic areas of interest, such as arts, engineering, and music, as well as any follow-up questions we have to clarify your child's interests. We would also like to take notes during this interview. No risks are associated with these questions and your child may choose to not participate, skip questions, or withdraw at any time. Your permission is required in order for your child to participate.

We will use this information to establish the common interest in creative subject areas among this age group of 18 and under.

Our hope is that by taking part in this interview your child will be able to create projects in the new library's makerspace that fit their interests! Feel free to contact us at gr-zuricha22-makerspace@wpi.edu with any questions that you may have. Thank you for your time.

Sincerely,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Name of Child: _____

_____ _____
Date Signature of Parent and/or Legal Guardian

_____ _____
Date Signature of Child (if over age 12)

Angepasst an das Beispielmaterial (Theofilou 78,79).

Liebe Eltern und / oder Erziehungsberechtigte,

Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute arbeiten wir mit der Bibliothek Buchs zusammen, um einen Plan für den Makerspace an ihrem neuen Standort zu entwickeln. Wir hoffen, dass unsere Planung zu einem gut gestalteten Raum führen wird, in dem die Gemeinschaft lernen und Projekte erstellen kann.

Wir möchten Ihrem Kind eine Liste von Fragen zu seiner Meinung über verschiedene Themenbereiche wie Kunst, Technik und Musik stellen und auch weitere Fragen stellen, um die Interessen Ihres Kindes zu klären. Wir möchten uns während dieses Gesprächs auch Notizen machen. Diese Fragen sind mit keinerlei Risiken verbunden, und Ihr Kind kann sich jederzeit entscheiden, nicht teilzunehmen, Fragen auszulassen oder sich zurückzuziehen. Für die Teilnahme Ihres Kindes ist Ihre Zustimmung erforderlich.

Wir werden diese Informationen nutzen, um das gemeinsame Interesse an kreativen Themenbereichen in dieser Altersgruppe bis 18 Jahre zu ermitteln.

Wir hoffen, dass Ihr Kind durch die Teilnahme an dieser Befragung in der Lage sein wird, im Makerspace der neuen Bibliothek Projekte zu erstellen, die seinen Interessen entsprechen! Wenn Sie Fragen haben, können Sie uns gerne unter gr-zuricha22-makerspace@wpi.edu kontaktieren. Wir danken Ihnen für Ihre Zeit.

Mit freundlichen Grüßen,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Name des Kindes:

_____

_____ _____
Datum Unterschrift der Eltern und/oder des Erziehungsberechtigten

_____ _____
Datum Unterschrift des Kindes (wenn über 12 Jahre alt)

Appendix D: Interview Questions (under 18): Gather Themes of Interests from the Community (English and German Translation)

Adapted from sample material (Theofilou 55-79).

As a part of our college project at Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We would like to ask you a list of questions of different topic areas of interest, such as arts, engineering, and music, as well as any follow-up questions we have to clarify your interests. We would also like to take notes during this interview.

No risks are associated with these questions and you may choose to not participate, skip questions, or withdraw at any time. Your permission is required in order for you to participate.

We will use this information to establish the common interest in creative subject areas among this age group under 18.

Initial (Sample) Questions:
Question 1
How often do you come to the library?
1. 1-2 hours
2. 2-3 hours
3. 3-4 hours
4. 4-5 hours
5. 5+ hours

Question 2
What are some of your favorite classes in school?
Question 3
Do you participate in any afterschool activities? If yes, please list them:
Question 4
What are some projects that you've done (something that you've created in or out of school)?
Question 5
What has been your favorite project?
Question 6
Rank your top three interests from the list below
1) Engineering/Robotics
2) Art
3) Music

4) Computer technology
5) Wood/metalworking
6) Science
7) Sewing
8) Cooking

Question 7
Is there a skill you're interested in learning but don't have the resources for?
Question 8
What do you think a makerspace is?

Angepasst an das Beispielmaterial (Theofilou 55-79).

Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute arbeiten wir mit der Bibliothek Buchs zusammen, um einen Plan für den Makerspace an ihrem neuen Standort zu entwickeln. Wir möchten Ihnen eine Liste von Fragen zu verschiedenen Themenbereichen stellen, die Sie interessieren, z. B. Kunst, Technik und Musik, sowie weitere Fragen stellen, um Ihre Interessen zu klären. Außerdem möchten wir uns während dieses Gesprächs Notizen machen.

Diese Fragen sind mit keinerlei Risiken verbunden, und Sie können jederzeit entscheiden, nicht teilzunehmen, Fragen auszulassen oder sich zurückzuziehen. Ihre Zustimmung ist Voraussetzung für die Teilnahme.

Wir werden diese Informationen nutzen, um das gemeinsame Interesse an kreativen Themenbereichen in dieser Altersgruppe unter 18 Jahren zu ermitteln.

Erste (Beispiel-) Fragen:
Frage 1
Wie oft kommst du in die Bibliothek?
    1. 1-2 Stunden
    2. 2-3 Stunden
    3. 3-4 Stunden
    4. 4-5 Stunden
    5. 5+ Stunden
Frage 2
Was sind einige deiner Lieblingskurse in der Schule?

Frage 3

Nimmst du an irgendwelchen außerschulischen Aktivitäten teil? Wenn ja, führe sie bitte auf:

Frage 4

Welche Projekte hast du gemacht (etwas, das du in oder außerhalb der Schule geschaffen hast)?

Frage 5

Was war dein Lieblingsprojekt?

Frage 6

Nenne deine drei wichtigsten Interessen aus der folgenden Liste

1. Technik/Robotik
2. Kunst
3. Musik
4. Computertechnik
5. Holz-/Metallbearbeitung
6. Wissenschaft
7. Nähen
8. Kochen

Frage 7

Gibt es eine Fähigkeit, die du gerne erlernen würdest, für die du aber nicht die nötigen Mittel hast?

Frage 8

Was ist für Sie ein Makerspace?

Appendix E: Interview Questions (over 18): Gather Themes of Interests from the Community (English and German Translation)

Adapted from sample material (Theofilou 55-79).

As a part of our college project at Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We would like to ask you a list of questions of different topic areas of interest, such as arts, engineering, and music, as well as any follow-up questions we have to clarify your interests. We would also like to take notes during this interview.

No risks are associated with these questions and you may choose to not participate, skip questions, or withdraw at any time. Your permission is required in order for you to participate.

We will use this information to establish the common interest in creative subject areas among this age group over 18.

Initial (Sample) Questions:
Question 1
How often do you come to the library in a week?
1. 1-2 hours
2. 2-3 hours
3. 3-4 hours
4. 4-5 hours
5. 5+ hours

Question 2
What is/was your favorite subject in school?
1) Math
2) English
3) Art
4) Science
5) History
6) Music
7) Other

Question 3
What do you value the most in education?
1) Innovation

    2) Grades/Academics
    3) Creativity
    4) Diversity/Culture

Question 4

What are some of your personal projects that you've done (something that you've created outside the workplace)?

Question 5

What has been your favorite project?

Question 6

Please rank your top 3 interests from the following from greatest to least (any other suggestions)
    1) Engineering/Robotics
    2) Art
    3) Music
    4) Computer technology
    5) Wood/metalworking
    6) Science
    7) Sewing
    8) Cooking

Question 7

What do you think of project-oriented learning? (Learning based on doing projects instead of structured formal learning)

Question 8

Is there a skill you're interested in learning but don't have the resources for?

Question 9

What do you think a makerspace is?

Angepasst an das Beispielmaterial (Theofilou 55-79).

Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute arbeiten wir mit der Bibliothek Buchs zusammen, um einen Plan für den Makerspace an ihrem neuen Standort zu entwickeln. Wir möchten Ihnen eine Liste von Fragen zu verschiedenen Themenbereichen stellen, die Sie interessieren, z. B. Kunst, Technik und Musik, sowie weitere Fragen stellen, um Ihre Interessen zu klären. Außerdem möchten wir uns während dieses Gesprächs Notizen machen.

Diese Fragen sind mit keinerlei Risiken verbunden, und Sie können jederzeit entscheiden, nicht teilzunehmen, Fragen auszulassen oder sich zurückzuziehen. Ihre Zustimmung ist Voraussetzung für die Teilnahme.

Wir werden diese Informationen nutzen, um das gemeinsame Interesse an kreativen Themenbereichen in dieser Altersgruppe über 18 Jahren zu ermitteln.

Erste (Beispiel-) Fragen:
Frage 1
Wie oft kommen Sie in der Woche in die Bibliothek?
1. 1-2 Stunden
2. 2-3 Stunden
3. 3-4 Stunden
4. 4-5 Stunden
5. 5+ Stunden

Frage 2
Was ist/war dein Lieblingsfach in der Schule?
1. Mathe
2. Englisch
3. Kunst
4. Wissenschaft
5. Geschichte
6. Musik
7. Sonstiges

Frage 3
Was schätzen Sie an der Bildung am meisten?
1. Innovation
2. Noten/Akademiker
3. Kreativität
4. Vielfalt/Kultur

Frage 4
Welche persönlichen Projekte haben Sie durchgeführt (etwas, das Sie außerhalb des Arbeitsplatzes geschaffen haben)?
Frage 5
Was war Ihr Lieblingsprojekt?
Frage 6

Bitte ordnen Sie Ihre Top-3-Interessen in der Reihenfolge vom größten bis zum kleinsten Interesse ein (weitere Vorschläge sind möglich)

1. Technik/Robotik
2. Kunst
3. Musik
4. Computertechnik
5. Holz/Metallbearbeitung
6. Wissenschaft
7. Nähen
8. Kochen

Frage 7

Was halten Sie von projektorientiertem Lernen? (Lernen auf der Grundlage von Projekten anstelle von strukturiertem formalem Lernen)

Frage 8

Gibt es eine Fähigkeit, die Sie gerne erlernen würden, für die Ihnen aber die Ressourcen fehlen?

Frage 9

Was ist für Sie ein Makerspace?

Appendix F. Email to Makerspaces for Interviews (English and German Translation)

Hello _____,
Our names are Connor West, Andrew Wirtz, Arturo Lemos, and Colleen Henderson. As a part of our college project at Worcester Polytechnic Institute in Worcester, Massachusetts, we are working with Bibliothek Buchs in St. Gallen Switzerland to develop a plan for their new location's makerspace. We hope that our design will result in a unique space where the community can learn and create projects, without overlapping with currently existing spaces in the area.

We would like to ask you, or any company representative, to meet with us sometime next week to go over some questions of different topic areas of interest at your makerspace. We'd greatly appreciate your response to best construct a plan for this new makerspace for the people in Buchs SG.

Feel free to contact us at gr-zuricha22-makerspace@wpi.edu with any questions that you may have!

Looking forward to hearing from you,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Guten Tag Herr _____,
Guten Tag Frau _____,

Wir sind Connor West, Andrew Wirtz, Arturo Lemos und Colleen Henderson. Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute in Worcester, Massachusetts, arbeiten wir mit der Bibliothek Buchs SG, zusammen, um einen Entwurf für den Makerspace an ihrem neuen Standort zu entwickeln. Wir hoffen, dass unser Konzept die Bibliothek zu einem einzigartigen Ort machen wird, in dem man lernen und Projekte erstellen kann, ohne dass es zu Überschneidungen mit den bereits bestehenden Räumen in der Umgebung kommt.

Wir möchten darum fragen, ob Sie oder ein Vertreter des Unternehmens, bereit wären, sich in der nächsten Woche mit uns zu treffen, um einige Fragen zu verschiedenen Themenbereichen zu

besprechen, die für Ihren Makerspace von Interesse sind. Wir würden uns sehr auf Ihre Antwort freuen, damit wir einen Plan für diesen neuen Makerspace in Buchs erstellen können.

Bei Fragen können Sie uns gerne unter gr-zuricha22-makerspace@wpi.edu kontaktieren!

Wir freuen uns darauf, von Ihnen zu hören,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

Appendix G. Supplier Questions (English and German Translation)

1. What is some of the most commonly purchased equipment and resources at your store?
    a. Do you offer non-profit discounts?
    b. Do you offer bulk purchase discounts?
    c. Do you have a catalog that we can review?
        i. Do you offer consumable resource supplies? i.e 3D printer filament, solder, arduinos
2. What workshops are held here?
    a. How often are these held?
    b. Which are most popular?
3. Is there anything else you would like to share with us?

1. Welche Geräte und Ressourcen werden in Ihrem Geschäft am häufigsten gekauft?
    a. Bieten Sie Rabatte für gemeinnützige Organisationen an?
    b. Bieten Sie Rabatte für Großeinkäufe an?
    c. Haben Sie einen Katalog, den wir durchsehen können?
        i. Bieten Sie Verbrauchsmaterial an, z. B. 3D-Drucker-Filament, Lötzinn, Arduinos?
2. Welche Workshops werden hier abgehalten?
    a. Wie oft werden diese abgehalten?
    b. Welche sind am beliebtesten?
3. Gibt es sonst noch etwas, das Sie uns mitteilen möchten?

Appendix H. Makerspace Interview Questions: Gather Themes of Interests from the Community (English and German Translation)

Expert Interview Questions for WPI Foisie Makerspace / Zurich Makerspaces Interviews

Introduction

Give an Overview:
- We are working alongside Buchs St. Gallen Library in order to design a makerspace that is inclusive for all
- If you permit, we request to record this interview to analyze the data for the purpose of our project

Provide Informed Consent:
- Will you allow the recording of this meeting and allow our team to use anything said during this interview for our report?

Build a Rapport:
- For how long have you been at this makerspace?
- What position do you hold here at this makerspace?
- Can you provide some insight into the space here, how operations go?

Open Ended Questions

1. What is some of the most commonly used equipment and resources at your makerspace?
    a. Why are these the most popular tools and resources?
    b. Any other pieces of equipment worth mentioning?
2. If any, what workshops are held here?
  a. How often are these held?
    b. Which are the most popular?
3. What aspect of this space do you personally like the most, and why?
4. Is renewal of resources an issue, if so how common must this be done?
5. What are some lesser considered aspects of a makerspace that would be helpful to know?
6. How has this space changed over time?
    a. If so, what was your role?
    b. Can you give some insight about the purpose of the design?

Conclusion

Closure
- Ask if they have anything more to add.
- Request any useful sources if they have any.

- Thank the subject and send a follow-up email post interview.

Review
- Collaborate notes and information with our group.
- Add the data and analysis to the google drive.

1. Welche Geräte und Ressourcen werden in Ihrem Makerspace am häufigsten verwendet?
   a. Warum sind dies die beliebtesten Werkzeuge und Ressourcen?
   b. Gibt es noch andere erwähnenswerte Ausrüstungsgegenstände?
2. Wenn ja, welche Workshops werden hier abgehalten?
   a. Wie oft werden diese abgehalten?
   b. Welche sind am beliebtesten?
3. Welcher Aspekt dieses Raums gefällt Ihnen persönlich am besten, und warum?
4. Ist die Erneuerung der Ressourcen ein Thema, wenn ja, wie häufig muss dies geschehen?
5. Was sind einige weniger beachtete Aspekte eines Makerspace, die zu wissen hilfreich wäre?
6. Wie hat sich dieser Raum im Laufe der Zeit verändert?
   a. Wenn ja, was war Ihre Rolle?
   b. Können Sie einen Einblick in den Zweck der Gestaltung geben?

Appendix I: Consent Form for Interviews with Experts (English and German Translation)

Adapted from sample material (Theofilou 55-79).

As a part of our college project at Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We hope that our planning will result in a well designed space where the community can learn and create projects.

We would like to ask you to complete a list of questions of different topic areas of interest within your makerspace. No risks are associated with these questions and you may choose to not participate, skip questions, or withdraw at any time. Your permission is required in order for you to participate, and you may have any representative from your company complete the interview.

We will use this information to establish the common interest in creative subject areas among makerspaces in Switzerland.

Our hope is that by taking part in this interview, it will show common interests among makerspaces in Switzerland! Feel free to contact us at gr-zuricha22-makerspace@wpi.edu with any questions that you may have. Thank you for your time.

Name of Company: _____

Name of Representative: _____

_____ _____
Date Signature of Representative

Adapted from sample material (Theofilou 55-79).

Im Rahmen unseres Hochschulprojekts am Worcester Polytechnic Institute arbeiten wir mit der Bibliothek Buchs zusammen, um einen Plan für den Makerspace an ihrem neuen Standort zu entwickeln. Wir hoffen, dass unsere Planung zu einem gut gestalteten Raum führen wird, in dem die Gemeinschaft lernen und Projekte erstellen kann.

Wir möchten Sie bitten, eine Liste von Fragen zu verschiedenen Themenbereichen auszufüllen, die für Ihren Makerspace von Interesse sind. Diese Fragen sind mit keinerlei Risiken verbunden

und Sie können sich jederzeit entscheiden, nicht teilzunehmen, Fragen auszulassen oder sich zurückzuziehen. Ihre Zustimmung ist erforderlich, damit Sie teilnehmen können, und Sie können jeden Vertreter Ihres Unternehmens mit der Befragung beauftragen.

Wir werden diese Informationen nutzen, um das gemeinsame Interesse an kreativen Themenbereichen unter den Makerspaces in der Schweiz zu ermitteln.

Wir hoffen, dass die Teilnahme an diesem Interview gemeinsame Interessen unter den Makerspaces in der Schweiz aufzeigen wird! Wenn Sie Fragen haben, können Sie uns gerne unter gr-zuricha22-makerspace@wpi.edu kontaktieren. Wir danken Ihnen für Ihre Zeit.

Name des Unternehmens:

_____

Name des Vertreters: _____

_____ _____
Datum Unterschrift des Vertreters

Übersetzt mit www.DeepL.com/Translator (kostenlose Version)

Appendix J: List of Makerspace Resources from Expert Interviews

Bischoff:
- 3D Printers
- Laser Cutters
- Microcontrollers
- Sewing equipment (with lights)
- Molding Machine
- Robotics
- Engineering (wood, cardboard, plastic)
- Video Production Equipment
- Hand Tools

Fablab Zurich:
- 3D Printers
- Laser Cutters
- CNC Machines (Metal and wood)
- Molding Machine
- Ceramics
- Sewing equipment
- Microcontrollers
- Hand Tools

Kinderlab:
- Sewing equipment
- Hand tools
- 3D printers
- Robotics
- Engineering (wood, cardboard, plastic)
- Telescopes
- Chemistry and Biology Equipment

ETH Student Project House
- 3D printers
- Hand tools
- Robotics
- Microcontrollers

- Engineering (wood, metal working)
- Laser cutters
- Sewing equipment
- Ideaspace with workbenches
- Materials shop
- Handheld CNC
- Soldering equipment
- Vacuum Former
- https://sph.ethz.ch/tools-and-machines

Brütwerk

- Hand tools
- Craft supplies (paints, glue guns)
- Power tools (drills, saws, Etc.)
- Engineering (wood, metal working)
- Sewing equipment
- Playground

Appendix K: Email Sent Through Bibliothek Buchs Newsletter about the Structured Survey (German Translation)

Im Rahmen eines Projekts an unserer Universität, dem Worcester-Polytechnic-Institute, arbeiten wir mit der Bibliothek Buchs zusammen, um ein Konzept für einen Makerspace an ihrem neuen Standort zu entwickeln. Wir hoffen, dass unser Beitrag zu einem attraktiven Ort führen wird, in dem wir gemeinsam lernen und eigene Projekte entwickeln und umsetzen können.

Darum möchten wir Sie bitten, eine Umfrage mit einigen Fragen zu verschiedenen Themen, die für euren Makerspace von Interesse sind, auszufüllen. Diese Fragen sind mit keinerlei Risiken verbunden, und Sie können sich jederzeit entscheiden, nicht teilzunehmen, Fragen zu überspringen oder abzubrechen. Ihre Zustimmung ist für die Teilnahme erforderlich.

Wir werden diese Informationen nutzen, um gemeinsame Interessen an kreativen Themenbereichen, sowie die benötigte Ausstattung des Makerspace zu ermitteln.

Wir erhoffen uns, durch Ihre Teilnahme an dieser Befragung, einen Makerspace in der neuen Bibliothek Projekte zu realisieren, der auch Ihren Interessen entspricht! Wenn Sie Fragen haben, können Sie sich gerne an gr-zuricha22-makerspace@wpi.edu wenden.

Vielen Dank für Ihre Zeit
Connor West, Andrew Wirtz, Artro Lemos, Colleen Henderson

Appendix L: Survey Consent Form: Develop List of High Priority Interests

Adapted from sample material (Theofilou 55-79).

As a part of a project at our university, Worcester Polytechnic Institute, we are working with Bibliothek Buchs to develop a plan for their new location's makerspace. We hope that our planning will result in a well designed space where the community can learn and create projects.

We would like to ask you to complete a survey with a few questions on different topics of interest related to your makerspace. No risks are associated with these questions and you may choose to not participate, skip questions, or withdraw at any time. Your permission is required for your participation.

We will use this information to establish the common interest in creative subject areas as well as equipment that will be added to the makerspace.

Our hope is that by taking part in this interview you will be able to create projects in the new library's makerspace that fit your interests! Feel free to contact us at gr-zuricha22-makerspace@wpi.edu with any questions that you may have. Thank you for your time.

Sincerely,
Connor West, Andrew Wirtz, Arturo Lemos, Colleen Henderson

I Consent __
I do not Consent __

Appendix M: Survey Questions

Are you interested in a collaborative space used for creating projects and learning new skills?

1. Yes __
2. No __

Please sort your interest in these topics, 1 being most interested, 6 being least interested (Drag and drop).

1. Engineering / Robotics
2. Arts
3. Sciences
4. Music
5. Wood / Metal Working
6. Computer Science

Which of the following equipment / computer programs would you be interested in using to create your own projects?

Tool	Not Interested	Interested	Would like to attend a workshop to learn
3D Printer	—	—	—
Laser Cutter	—	—	—
Sewing Equipment	—	—	—
Woodworking/ Handtools	—	—	—
Microcontrollers and electronics	—	—	—
Photo Editing Software	—	—	—
Computer Aided Design (CAD)	—	—	—
Computer	—	—	—

Programming			
Robotics	—	—	—

For us to best design workshops, how old are you?
1. Under 10
2. 10-14
3. 15-18
4. 19-65
5. Older than 65