

Makers in the making

Report from "Makerspaces in Digital Youth Work" Luxembourg July 3rd – July 8th 2017

This article is an outcome of the international training course "Makerspaces in digital youth work". The training was hosted 3 to 8 July 2017 in Luxembourg by Service national de Jeunesse.



Written by seminar facilitator **Juha Kiviniemi**.

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Digital youth work methods have seen a significant growth in interest in Europe over the last few years. The use of digital tools and methods is now more than ever accepted as a part of youth work. This is a direct result of the increasing prevalence of technology and increased pervasiveness of digital tools and networks in young people's lives; if Youth work wants to keep up to the task, it needs to adopt new methods and approaches. Young people will also need a significantly different set of skills in their future employment because technologisation and digitalisation of society are making some current professions obsolete while creating some brand new ones¹. In developing these skills and fostering a new way of non-formal learning, makerspaces have the potential of having a significant impact.

With this in mind, the bright minds of the Luxembourgish youth service (Service National de la Jeunesse, or “SNJ” for short) wanted to share their existing approach of using Makerspaces in a digital youth work context. While many countries have developed various excellent digital youth work methods, just as many have yet to experiment with setting up permanent makerspaces within or in close collaboration with goal-oriented youth work. Maker approaches are indeed arguably a rising trend in digital youth work activities.

After securing funding from Erasmus+ via the Luxembourgish national agency Anefore and hiring a facilitator, it was time to move on to the big questions: How can we define a program so as to have a balance between theory and practical learning-by-doing? How do we keep the momentum going all through the four-day training course? What tools do we want to propose for the participants to use? And - most importantly - how do we get the right people on board?

After an intensive preparation meeting and with a finalised and very hands-on program planned, we set out to the training with the end-goal of building the basis for a network of Maker enthusiasts connected to youth work all around Europe. This article is one account of what followed.

Day 0

As is often the case with Erasmus+ training courses, one of the first significant challenges was the selection of participants. Many an e-mail was sent back and forth between the preparation team and the national agencies before arriving at a final participant roster of 20 youth work professionals from 13 European countries. The selection was quite a process, considering the original amount of 192 applicants! As usual, people filed into Luxembourg on Monday on individual arrival schedules. What was quite uncommon, though, was the

¹ e.g. <https://www.sitra.fi/en/articles/trend-1-riddle-work-income/>

very active communication within the group even before arrival. While it is now fairly standard for digital youth work trainers to implement a digital platform to stay in contact before, during and after training courses, I had never before seen such active participation. We had ample real-time information on people arriving, and participants were making connections even before the program had formally started. Active involvement of the preparation team in the social media platforms might have had a hand in this.



Starting up with Maker principles.

The participants hailed from varied professional backgrounds. Their context ranged from large European capitals to smaller, even isolated communities. Participants worked in education, start-ups, municipal youth work and some volunteered in NGO's. The common denominator was readily apparent: in addition to their connection with their local youth work field all shared a passion for maker approaches and innovating new solutions for youth work.

We had planned on several group-building activities for the first evening, but this group seemed to require only minimal encouragement to get the discussion going. With only slight, annoying interruptions - of the organising team going through some necessary practical information - the training was well underway.

BEE CREATIVE - The Luxembourgish makerspace network

Makerspaces are open spaces, where people - especially young people - are offered creative digital tools within a permissible and inspiring environment. As opposed to a fablab, where the aim can more often be direct prototyping a product or a solution², makerspaces are more of a place for collaborative learning and experimentation. While makerspaces are often stocked with hi-tech equipment like CNC-routers, 3d-printers and laser cutters, these devices are not a requirement for a facility to be considered a

² The Maker Movement. Implications of new digital gadgets, fabrication tools and spaces for creative learning and teaching. https://www.openeducationeuropa.eu/sites/default/files/legacy_files/asset/Learning%20in%20cyber-physical%20worlds_In-depth_39_2.pdf

makerspace. It's more about fostering innovation and co-creating something new from the resources available.

The Luxembourgish network of makerspaces was launched in 2015 under the BEE CREATIVE programme with six locations. It is run in practice by the Service national de jeunesse (responsible for non formal education and primary schools) and SCRIPT (taking care of formal education in high schools); both services of the Luxembourg Ministry of education, children and youth. The programme is part of a broader national digital strategy that seeks to promote equal access to ICT tools and aims to utilise the full potential of technology to address the needs of different learners. The strategy also seeks to increase digital competencies that are now vital both in employment and personal life.



Inside the Cre8 makerspace at Lycée Technique d'Esch-sur-Alzette

These goals - that are well in line with recent European digital youth work developments - are realised in the makerspaces with a tight-knit collaboration between the Luxembourgish formal education system and the youth work field. Makerspaces function within schools and offer a great place for learners of different ages to complement the skills they learn in formal education. Working together with young people in one of the makerspaces can also be a valuable tool for teachers and other formal educators to gain new insight of their group of learners. As for the youth work field, the approach of setting up youth-work run makerspaces in formal education settings could be an avenue to build bridges between the formal and non-formal sectors - a central challenge that seems prevalent in most if not all European countries.

The maker movement behind the idea of makerspaces is founded on the assumption that anyone can be a creative, inventive and productive individual. The best way to foster these traits is to learn in an informal environment via learning-by-doing and playful experimentation. According to Mark Hatch's "Maker movement manifesto" (2013), one definition of the main basic principles of the maker movement could be "make, share, give, learn, tool up, play, participate, support and change". While makerspaces as institutions can have a large role in holding up these principles - especially the ones pertaining to providing access to tools and supporting learners - the question in a youth work context is much more about fostering and guiding a community of young peers and providing support and encouragement via youth work pedagogic approaches. As with digital youth work in

general, it is not about the technology - youth work values and goals should always remain at the core of the work.

Maker culture is all about sharing and learning together, which can be realised in community events such as Maker Faires. The realisation of youth work goals is also best observed by meeting and talking to young people themselves. With this in mind, we set out start our first full day at the Makerfest held at Lycée Technique d'Esch-sur-Alzette, one of the original schools of the permanent BEE CREATIVE makerspaces.

Day 1: Engaging and empowering activities

Stepping into Lycée Technique d'Esch-sur-Alzette was a breath-taking experience. Over 2000 young people and 1000 other visitors were set to attend the maker fest that day. Indeed right from the entrance, you could see a crowd of kids and youngsters milling around, tinkering with technology with the guidance of more experienced peers and experimenting with new tools. In most youth events, you can almost immediately spot groups of young people that have obviously no interest in being at there but have rather been forced to attend. That was not the case here. I saw no groups hanging around on the fringes, and almost everyone seemed excited and eager to try out everything that was available. This was naturally also true for our group and we lost one participant right off the bat before we even had the chance to hear out BEE CREATIVE's co-coordinator Serge Linckels' presentation of the Luxembourgish model of non-formal technological education and the makerspaces established in the secondary schools of Luxembourg as part of the nationwide Digital Luxembourg initiative.



Burak Berg Doluay (Cyprus) soldering in the Maker fest.

In addition to BEE CREATIVE Serge is also a coordinator in SCRIPT - "Service de Coordination de la Recherche et de l'Innovation pédagogiques et technologiques" - an organization that promotes and applies technological innovation, research and training within the school system, quality assessment within the education field and promotes & trains technological skills for schools and other educators. This is a good example of how digital youth work - the makerspaces in this example - should be tied into a broader context of formal

and/or non-formal education. Serge told our group about how makerspaces have been challenging to set up due to lack of expertise within the education field; a situation that thankfully is slowly improving. This is most likely true for the youth work field as well.

So far there have been 25 makerspaces set up in schools all over Luxembourg, most with the help of participating NGOs and companies. According to Serge one of the central challenges is that although contemporary employment often requires skills with electronics and technology, kids aren't interested in these topics as such. Makerspaces try to address this by using technology as an educational medium for fostering and feeding young people's inherent creativity and tendency for experimentation while enabling them to learn practical skills related to technology. This innovative environment can hopefully also translate into increased creativity in regular classroom settings. To support this transference, teachers in secondary schools also use the makerspaces for general classes as well as implement "project weeks" that make use of the makerspaces' possibilities. Students can also receive study credits for the work they do in the makerspaces.

Serge told the group that working together in makerspaces also has a positive impact on teacher-student relationships. Makerspaces - and the peer learning so central to maker culture - also seem to foster a culture of active participation in young people. This was apparent walking among the booths and workspaces set up in the hall; in almost every spot the main responsibility of guiding the kids in attendance was with the older youngsters and teens that are already active in the makerspaces. If even a fraction of this responsibility and active attitude is carried onto other aspects of these young people's lives I would say that youth works often recited goal of fostering "active citizenship" is well on the way of being met.



Another youth work goal of supporting kids' confidence in their abilities seems to also be well in hand with maker approaches and activities. I was walking around with my camera and started checking out a Lego Mindstorm robot (photo left) at a table. A 13-year-old girl approached me and asked - in English far better than mine - whether I would like an explanation of what was on display. She proudly presented me with one of their group's Lego robots as well as a non-lethal mousetrap they had designed and built together. What I was impressed with - in addition to a confidence seldom seen in kids this age, especially towards an unknown adult

communicating in a foreign language! - was the fact how the kids talked about the people they have met, places they have been and new friends they have made when competing with their team with their Lego robot, rather than talking about the technology involved.

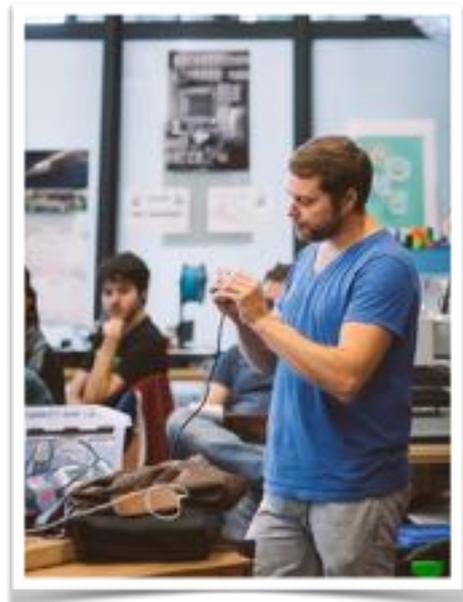
“At first I thought I wasn’t going to like this tech stuff”, the girl explained to me. “But once I had the courage to just go for it and try it for myself, I found out I really liked it and was also good at it. I don’t even mind I’m the only girl in the group.” She also explained how she doesn’t see herself as a “geeky girl” either - her other hobbies included sports and other diverse activities. To me it was apparent that the kids have had a tremendous boost of confidence from their activities and connected with several of their peers both locally as well as with groups of youngsters from other continents. One participant from our group later recounted a similar encounter with these very outspoken young people. This once again illustrates the fact that digital youth work is not about the technology itself, but rather a worthy tool to support young people’s growth and skills.

Our participants had little over an hour to freely roam around the maker fest and try out as many things they could. Predictably it was quite the challenge to get everyone on the bus heading back to the city centre; the last missing participant was still fully immersed in a virtual reality setting when we managed to finally find him. After a couple of checks that everyone was on board - just like travelling with a group of young people! - we headed towards our main training ground, the Base1 makerspace in Forum Geesseknäppchen.

Base 1 makerspace

Most of the activities in our training took place in the Base1 makerspace. It is located in central Luxembourg in a former office building, now converted into a youth centre with activities focused on creativity, technology, entrepreneurship and art. Several schools reside in the same campus area, so the Forum has no shortage of potential visitors. The students even have their lunch cafeteria on the top floor of the building. The makerspace itself has been open for the students to use during their breaks whenever staff is available.

Robert Schommer, who works as a freelance coach in the Base1 makerspace was the primary trainer for our practical activities in the makerspace. He began by presenting the makerspace and told us a little



Robert Schommer explains workshop safety considerations for our group as a volunteer of Base1 listens on the background.

about its history. It turns out that when they first set up the makerspace in January 2016, it wasn't easy to get young people to come over. Hobbies and activities relating to technology and electronics can still be viewed by youngsters to be an attractive pastime only for a limited group of people already interested in the subject. This reiterates what the girl in the maker faire said about her own assumptions as well as Serge's view on young people's interests. It then falls for the youth workers and other adults to motivate kids to at least try their hand in the activities offered also outside their formal curriculum. Robert told our group that their eventual breakthrough in motivating kids to come to the makerspace was very familiar to many youth workers: they offered free food. Gradually they had kids try out their hand in some basic activities and slowly built up on that. Meanwhile, the teachers bringing more students to the makerspace combined with the word-of-mouth from the kids already familiar with Base1 started gradually adding to their user base.

Robert explained how the equipment in Base1 is categorised according to safety and how much experience is needed for each tool. User safety is an important consideration when setting up a makerspace, especially one that is aimed at younger users. Base1, like many other makerspaces, has colour-coded all equipment and tools based on whether kids need previous experience or adult supervision in using them. Since our group was going to be working in the makerspace extensively during the week, the safety instructions were naturally also aimed for our group to consider.

There are many pre-fabricated kits available on the market that can be used as starting points for creative maker activities. While Lego Mindstorm robots have been on the market for a while now and have been widely used for technological education, there are also other options now available. Our practical workshops kicked off with building robots with mBot³ kits in teams of two. mBots have been described as expandable, programmable and open-source robotics kits that are seen to be more "maker-minded" than most commercial building kits. With the added challenge of having the instruction manuals removed from the boxes, our teams set to build their robots.

The robots have varying degrees of autonomy based on their programming and the sensors attached to them. Robert's pedagogic approach was the same one he and many other makerspace coaches use; while he gave the participants information on how different sensors work, he did not readily give recommendations on which sensor to use in a specific scenario. This is meant to encourage logical thinking and learning by experimentation. The teams of participants managed to build their mBots fairly quickly, and many teams also managed to decorate their robots, with some embellishments even adding functionality.

³ mBot: "One robot per child". <http://store.makeblock.com/product/mbot-robot-kit>

The mBot in the cover of this article, for example, has a little parasol and a "skirt" attached to try and make the light-based sensors function more reliably in bright sunlight.

After building up their mBots, the teams were tasked to test their robot on an obstacle course built in the lobby. The goal was to get the fastest time going from point A to point B; this was a perfect learning experience on different technologies and their limits within. The most basic way of controlling a mBot is the included remote. Since the infrared remote is unreliable, it was more efficient to use the onboard sensors. They again had their specific limitations; like previously mentioned, the contrast-based sensor following a line on the floor was prone to failure when the amount of light changes. Likewise, the ultrasonic sensor has its own limitations.

Pre-fabricated kits seem like a low-threshold starting point for applying maker methodology within youth work. Many of the tools or kits don't need major financial investments - at the time of writing, the basic mBot kit, for example, retails for around 85 euros. With these kind of relatively inexpensive tools, youth workers can start implementing technological education irrespective of the environment they operate in.

The importance of European cooperation

Many actors in the European youth work field have a long history of implementing digital youth work tools and approaches. Those approaches, however, have often stayed only in the local communities or at best have been only spread on a national level. Since technology is advancing at a rapid pace in our interconnected society, the challenges posed for youth work are very similar in many countries.

It is also important to note that digital youth work - as well as youth work in general - is always rooted in the cultural reality it is developed in. The Screenagers research project⁴, a collaborative study focussing on the use of ICT, digital and social media within youth work, identified very differing definitions of digital youth work. The practical implementation is also varied; while some countries - eg. Finland - are somewhat more advanced regarding using online tools in youth work, others are more advanced in adopting different digital tools like

⁴ Screenagers international research project: using ICT, digital and social media in youth work. International research report, 2016. <http://www.youth.ie/sites/youth.ie/files/International%20report%20final.pdf>

GPS tracking apps for adventure activities or makerspaces⁵. There is much to be gained in the mutual exchange of experience and practices on a European level.

One of the central instruments of realising cooperation between youth work professionals from different member states is the Erasmus+ program. While it seems that many youth workers are quite familiar with youth exchanges that are financed within the program, the activities relating to youth worker mobility could be even more widely utilised. Naturally, it is not feasible that all exchange of good practices would only stem from Erasmus+ activities since the instrument requires quite long-term planning. We should rather focus on building practice exchange and lasting networks across member states. The tools already exist and quite many are readily available - what the professional field lacks in general, though, is the incentive to actively use those tools. Taking part in training courses or implementing new projects through Erasmus+ can obviously give that incentive a sizable boost.

One of the main goals of this training course - as is common with almost every training course - was to enable participants to make connections with practitioners from different member states. Especially with digital youth work trainings the question is often also of finding the correct tools to continue sharing good practices and implement ongoing collaboration without having to go through the process of drafting and submitting a further application for Erasmus+. In this training course, we had a session on the last day where participants were tasked to define a common ground for moving forward. They first outlined goals for future cooperation, the obstacles that could arise as well as the tools they knew they could implement. Because it is not realistic to adopt all tools at once, they were finally tasked to prioritize the ones they wanted to start up with. The participants settled for a Facebook group - that has afterwards been somewhat active even during the summer holidays - as well as a shared google drive folder for sharing materials. These are very basic tools that can be implemented in any youth work setting, but often suffer from a lack of structure and goals. This can lead to severe under-utilisation of the tools potential.

The above is also true in the wider context of digital youth work. While talented and motivated practitioners can be found in many youth work organisations throughout Europe, strategic planning of digital youth work on an organisational level is still often lacking. There might be some help around the corner in the form of European guidelines and policy recommendations. The EU expert group on youth and digitalisation⁶ was appointed by the European Commission in 2016. The group is tasked to draft recommendations on European digital youth work policies as well as define training needs for youth workers. The

⁵ The seminar report "Taking youth work to the digital world" by Nerijus Kriauciunas and Juha Kiviniemi (2016). <https://www.verke.org/wp-content/uploads/2014/09/Taking-youth-work-to-the-digital-world.pdf>

⁶ http://ec.europa.eu/assets/eac/youth/policy/documents/mandate-expert_group-digitalisation-youth_en.pdf

recommendations set to be published in late 2017 will likely give actors in the youth work field an even better common base for future cooperation and collaboration.

Day 2: Bridging the gap

Activities in makerspaces often include "physical computing", that encompasses several digital tools such as sensors or microcontrollers that are used to control systems, regulate motors and other hardware or to make analogue signals available for computer software⁷. Robert started the second full day with a short discussion on what this means in an informal learning context. Abstract subjects like programming or 3D -



Robert explaining the basics of Scratch.

modelling can be intimidating for some and hard to approach for many. Makerspaces and physical computing try to tackle this by bridging the abstract world of programming with tangible objects. It could be argued that most people would not willingly take the time to figure out how infrared sensors behave in direct sunlight; however, when coupled with the objective of making your mBot faster on an obstacle course the exercise suddenly becomes worthwhile. Similarly, programming robots or laying out code to control single-board-computers like Raspberry Pis can motivate people to build the skills of abstract logical thinking by giving them tangible, real-world results.

⁷ The Maker Movement. Implications of new digital gadgets, fabrication tools and spaces for creative learning and teaching. https://www.openeducationeuropa.eu/sites/default/files/legacy_files/asset/Learning%20in%20cyber-physical%20worlds_In-depth_39_2.pdf

Getting to know programming with Scratch

For the first activity of the day the participants got to try out Scratch⁸, one of the most common tools to introduce young people to programming. Scratch is a visual programming language developed by MIT that is aimed at 8 to 16-year-olds. It is free for anyone to use. It also reflects the maker movement principles in that it relies heavily on sharing and a user community. Many maker kits are also programmable with Scratch, or it's derivatives.

Since no prior experience of coding is required, and users do not need to write any actual code, Scratch is a perfect introduction to the logic of programming languages. This internal logic is very similar in many if not most major "proper" programming languages. The participants were tasked to build small animations within the platform, something that is easily converted into a youth work activity.

Tinkering with 3D-modeling

The second platform our participants got to know was TinkerCad⁹, an open-source and free-to-use online platform for creating 3d-models. While often used for designing 3D-prints in makerspaces, we used the platform to draw up designs for the laser cutter. This was a choice mandated by the slow printing speed of even the most modern of 3D-printers now commercially available. By choosing to fabricate the designs using an MDF sheet and a laser cutter, the fabrication time was cut down to minutes instead of hours per piece.

Tinkercad is a good example of how free maker tools can be used to develop young peoples' skills that are directly translatable to many modern professions. The logic of Tinkercad is very similar to the "industry standard" modeling program AutoCAD - which should come as no surprise, since the same company is behind both platforms.

With Tinkercad and the laser cutter it became very apparent how maker approaches can bridge the gap between the often abstract design phase and the real-world products: many participants were designing practical objects (logo plates for their office, earrings etc.) within mere minutes of getting the basic run-down of the program's features. Many useful real-world objects were immediately prototyped on the spot. I struggle to find a better motivator for young learners to immerse themselves in learning the ins and outs of 3D-modeling software or the process of design.

⁸ <https://scratch.mit.edu/about>

⁹ <https://www.tinkercad.com/>

Building the bug



In addition to physical computing many maker activities rely on either building new electronic devices or repurposing obsolete ones. Even ready-made maker kits can sometimes require attaching devices for outside input or output. When making new connections or modifying or repairing equipment the basic skill of soldering is often needed. Robert gave our group the task of building "The Bug" - a very basic project that can be done even with very young children. The bug basically consists of a battery holder and a vibration motor similar to the one you find in cell phones.

The task for the participants was to try their hand in soldering by attaching the vibration motor to the battery case. While some participants had never tried soldering before, everyone got through the exercise with only minimal burns. Robert explained at one point how educators and other adults are often extremely anxious about kids accidentally injuring themselves. While this is true to an extent, when following basic workshop safety rules serious injuries are very rare. While there is a 3-stage rating system for "boo-boos", very few children want to use the higher classifications for fear of being made to leave for the day to patch themselves up. The little mishaps then become a learning experience - like one participant put it, when you grab the wrong end of the soldering iron once, you are likely to be more cautious in the future.



Carlos Alcobia (Portugal) and Mikko Turunen (Finland) solder their bug.

The simple task of making the bug also brought out the creativity of many participants. While the challenge was defined as to only make something that resembles a bug and moves via vibration, many teams added decoration and embellishments to make their bug look unique and personal.

Outdoor activities in a makerspace training?



One team embarked on their outdoor task in a canoe.

For the afternoon we had scheduled an excursion into Lultzhausen and the outdoor activity centre run by SNJ by the lake. Participants had the chance to have a change of pace from the indoor maker activities while getting another view into Luxembourgish youth work. While there were only some digital approaches incorporated into the outdoor activities - e.g. looking up coordinates in Google maps or taking selfies in specific coordinates - it can also be argued that

adventure education can bare close kinship to maker activities. After all, many activities in both forms of youth work are built around creativity and working as a team. While the activities at the lake were done in four teams, it wasn't a competition as such, but rather another form of fueling the creativity and cohesion of the group. After a nice barbecue and an informal discussion on the possibilities of experiential education, it was time to take the bus back to the city and head recharged into the next day.

Implementing Maker methodology in youth work

Developing lasting practices of digital youth work requires long-term planning and inclusion of digital youth work approaches into existing strategies. The Screenagers research study identified five key areas for developing digital youth work: Strategic financial investment, meeting identified training needs, challenging resistant mind-sets, ensuring policy commitment and providing youth workers with written guidance¹⁰. If these requirements are not met, rooting new practices - whether makerspaces, other digital youth work tools or any other new approaches - permanently into the local youth work environment will be challenging.

One hurdle we often work with in Verke's national digital youth work trainings is challenging resistant mind-sets. Often when trying to develop new forms of youth work there is resistance to new tools and approaches, mostly because practitioners do not yet understand the value of a given approach to youth work goals. That is why it is essential to

¹⁰ http://www.youth.ie/sites/youth.ie/files/Infographic_ScreenagersResearch_accessible.pdf

keep in mind that digital youth work never exists in a vacuum but should be tied in with existing youth work tradition and goals.

Some have even argued that maker methods - digital tinkering, soldering, 3d-printing etc. - do not have applications in "serious" goal-oriented youth work but are rather merely a fun free time activity. I would disagree and would rather submit to sceptics that maker approaches and methods have many similarities with youth work's long-standing tradition of using arts and crafts as both a youth work activity and a tool, e.g. strengthening group dynamics. Maker approaches are merely a new version of those methods; similarly to the more "traditional" arts and crafts, makerspaces give young people practical skills while being a fun and engaging activity. While digital tools, in general, are still sometimes met with resistance and scepticism, doubts can be alleviated by building connections to traditional youth work tools.

This comparison can also often be instrumental when practitioners that are playing catch-up with current technological trends have to propose to their organisations their plans to implement new methods. Securing funding and other resources for a full-fledged makerspace is often a challenging task in almost any organisation. Luckily many approaches can be implemented even with minimal funding. Still, it is vital that practitioners can advocate the importance of their chosen methods so that organisations can secure them the resources - at a minimum, the working hours - they need. Youth work organisations need to make sure that the pioneers of any new form of youth work have the time to plan, try out, evaluate and share their approaches.

I would even argue that all forms of youth work could benefit from adopting some of the previously outlined maker principles. We practitioners often do not have the reflex of sharing our practices and innovations with our peers. We also sometimes lack the culture of experimentation and tend to follow the path of least resistance - whether in our tried-and-true methods or long-time staples of our field. More collaborative non-formal learning and an even stronger focus on building communities that young people want to take part in could strengthen all aspects of goal-oriented youth work.

Day 3: Good practices abound!

On day three we had reserved participants the chance to share their views and approaches in their workshop sessions. Since participants came from 13 different countries and various professional backgrounds, there was much to share with the group. The proposed topics ranged from "Engaging young people, fostering motivation and creativity" or "finding funding opportunities" to specific challenges in working with young people for example in

remote or rural areas. There were also presentations on specific approaches, such as Burak Berk Doluay's presentation of CyprusInno¹¹ ("Building peace through entrepreneurship and innovation with the help of technology"). David Allistone presented their project's (Exploring senses¹²) activities such as digital fabrics and toyhacking in his workshop "Combining arts & crafts with digital tools", and Mikko Turunen engaged participants in making live music with Ableton live link¹³. Though time was limited, we managed to squeeze in most proposed workshops and discussions, and we hope participants will continue to share their views and approaches also in the future.

Workshops: Electronics, music and Makey makey

In the second program of the day the group was split into three smaller, simultaneous sessions. The first session hosted by Robert explored fabricating a digital alarm clock from a ready-made, inexpensive kit. The idea was to again expand on the basic skill of soldering by adding components to a pre-fabricated circuit board. The set was very simple, and each component had a specific role in the assembly. Robert also explained how,



again, this skill could be combined with something else entirely - since the alarm circuit is just a switch it could be used as a timer in a larger project. One participant exclaimed "Good luck getting through airport security with this one!"

The second session was about Makey makey¹⁴ and simple programming logic. Chris, who was hosting the workshop, had the participants use one of them as a robot that others could "code" by giving them simple instructions ("Move forward two, turn left, move forward one" etc.). Participants very quickly realised how programming logic is very complex in that you have to take into account a good amount of variables: what does the "robot" do when it encounters an obstacle? How long is "one step"? Chris then proceeded to demonstrate Makey makey, a controller board that transforms anything conductive into a

¹¹ <https://cyprusinno.com/>

¹² <http://exploringsenses.co.uk/>

¹³ <https://www.ableton.com/en/link/>

¹⁴ <http://www.makeymakey.com/>

USB-controller. A good example is making a piano that is controlled by bananas. This, of course, can again be combined with different activities - you could, for example, make a robot based on Arduino¹⁵, build its frame from tinkercad-designed and 3d-printed parts, program it with Scratch and build a controller out of cucumbers.

The third workshop hosted by Marat explored the creative possibilities of digital music production tools. The participants tried their hand in singing a few lines and altering the sound digitally, as well as creating brand new instruments on sampler pads. People don't necessarily think of music production belonging in a makerspace setting, but the activity actually fits pretty well into the fold. After all, making music and creating digital instruments is in the core of creative activities. Making music can be combined with other maker activities as well; you could, for example, create interactive art works using conductive ink and LittleBits¹⁶ synth sets. That's really the beauty of the current technological progress and many maker approaches: it is not an exaggeration to say that your imagination is the most limiting factor. Of course, it often falls to the youth work field to make these possibilities available to as many young people as possible.

Hunting for digital treasures

In way of "learning-by-doing" we had scheduled an evening activity for the participants using current digital youth work tools. We had built a "digital treasure hunt" on a platform / app called "ActionBound"¹⁷, that enabled us to reach several goals at once: light evening



activity as a group, some local history, some information about maker culture and digital youth work as well as an introduction to a practical tool that participants could use with their youngsters. The organising team was learning as well since we had never before built a "bound" before.

GPS-enabled apps like ActionBound are a great example of using digital tools

¹⁵ Arduino, an open-source electronics platform based on easy-to-use hardware and software.
<https://www.arduino.cc/>

¹⁶ <https://littlebits.cc/projects/synth-kit-pro-station>

¹⁷ <https://en.actionbound.com/>

alongside traditional youth work methods. They could be applied in almost any youth work setting, provided that they happen outside and at least one participant (per group) has a GPS- and internet-enabled smartphone. These tools can be a nice way of modernizing outdoor activities, for example, or used to engage participants in a youth exchange to learn about the city they are visiting. The tasks can also be interactive, so the platform can again be used to support the participants' creativity via e.g. having them take a selfie or produce a short video. The feedback gathered from the participants showed that many were very interested in trying out the platform for themselves when they got back home.

And the treasure at the end? Of course, we had to honour the age-old tradition of using food as a prize so often used in youth work: the "main prize" was the address of the restaurant we were eating dinner in.

DAY 4: Make@on

I have previously mentioned how many maker activities have the potential to be connected to each other. Likewise, the paths that learners are enabled to take in honing their skills are built on top of previously learned skills. Nowhere is this more evident than in a Make@on, where participants are invited to use all the skills they have accumulated so far in a creative, collaborative task. This was what we had planned for the last full day.

We are all familiar with the form of "goodie bags" so ubiquitous in most if not all seminars. While these bags usually contain leaflets, branded stationery and disposable pens, stickers (which are usually the coolest part!) along with a printed seminar program, we took a somewhat different route. Our participants all received a goodie bag containing an Arduino-based programming platform, some sensor components, a Makey makey etc. -



basically a solid starting point for participants to start projects of their own back home. The participants used the same set of components for the make@on where their task was to plan and build - as ready as the time-frame allowed - a project of their own collaborative design.

Again it was great to see how the participants sprung into action with great enthusiasm. The teams very quickly decided to divide tasks among members; for example for one of the

groups some dived into building a robot, some concentrated on figuring out how to program it with scratch and some concentrated more on the visual design of the product. Teams were also keen to help each other out; while each group had their own goal in mind, they did not hesitate to help others whenever they could.



Although we had planned to discuss building a network during the last hours of this day, we ended up using the whole day for the group projects. Even then most teams weren't finished with their projects, although this was to be expected in the limited time they had available. The projects included a self-programmed quiz controlled via Makey makey, which in turn was controlled by a remote-controlled robot; an autonomous robot (decorated as

a bird, no less!) that used sensor inputs to stop and go; a miniature lunar lander with custom shock absorbers; a robot controlled by a gyroscope (theoretically) implanted in a custom 3d-printed wristband and a 3d-designed, laser cut cube out of MDF and led-lights that could be used as an educational tool.

Many of the projects were incredibly ambitious, and Robert confirmed that the situation is pretty much typical to Maker projects: they often end up taking more time than initially estimated. In this case, many of the projects would have benefitted from additional time for troubleshooting code and physical connections, but the concepts were solid! One attached "condition" to the goodie bags was that we hope participants to share their creations with a wider audience or, at least, within the group. We will see what the participants come up with in the future.

Evaluation: "5/5 would do again"

In this training, we implemented two kinds of feedback and evaluation: one was a short, mobile-friendly daily feedback form and the other was a final feedback form for the whole seminar. Both were created with a free online tool called TypeForm¹⁸, one which we encouraged participants to try out in their future activities. One participant in particular mentioned how giving constant feedback every day was a good way of reflecting on the

¹⁸ <http://www.typeform.com/>

day's activities; as a facilitator I find it to be an excellent tool in keeping a finger on the pulse of how things are going during a training course.

" I gained so many ideas how to use these for projects at home as well as on future international exchange projects. "

The feedback showed that participants were really happy with the training as a whole. Most critique arose from time table issues and the balance between theoretical input vs practical workshops. The feedback regarding the schedule was expected,

since drafting up a program for a training course is always a balancing act between the relatively short time allotted for a single training and needing to cover as many subjects as possible. Regarding the side of the theoretical input the critique is well-founded; were we planning the program now, we would probably make a more distinct line between the theoretical inputs and the hands-on workshops. In this seminar, both sides were quite intermixed and I can see how it was hard at times to "switch gears" inside sessions. Likewise, since the end-goal was to start up a lasting network for exchanging good practices and engaging even more practitioners, I would try to incorporate even more digital tools during the training that could be seamlessly transitioned into building and maintaining a network of practitioners over distances.

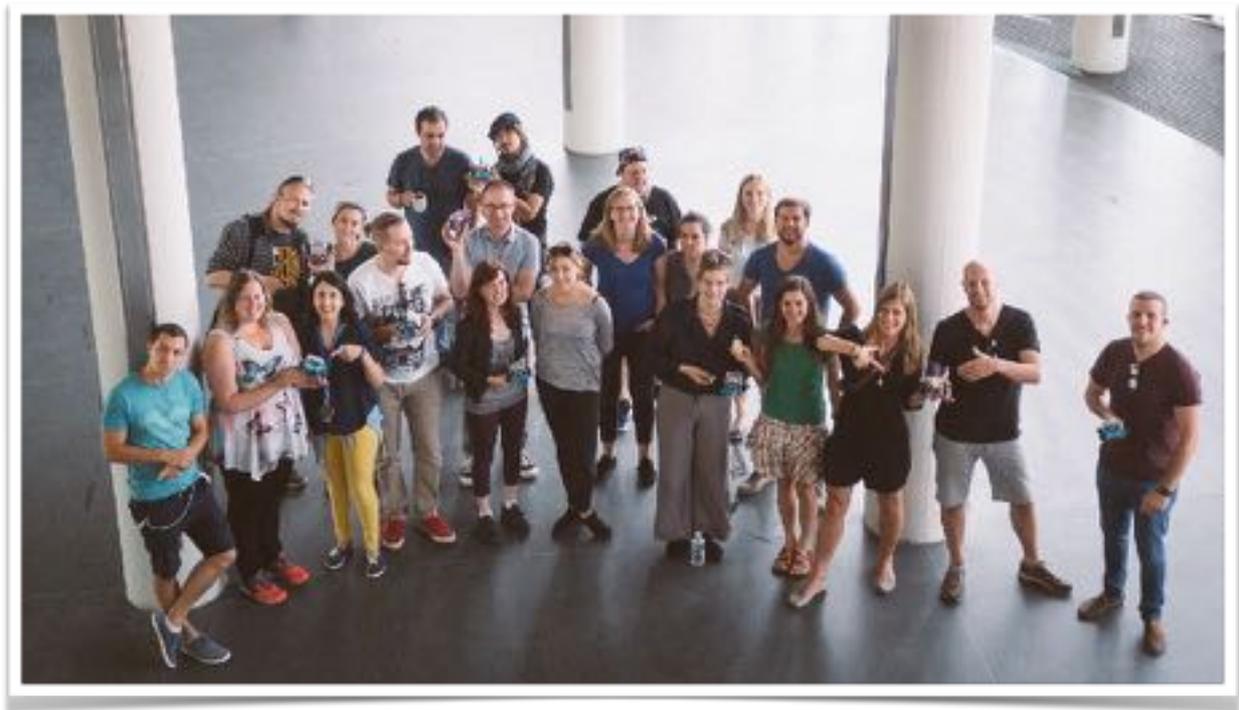
" #BestProjectEver "

I am certain that the participants of this training are now - if not previously - convinced of the possibilities of using makerspaces as a viable form of youth work. The question now becomes twofold: whether they will be able to convince their possibly sceptic colleagues or other educators; and whether their firm belief will be allowed to translate into practical youth work applications. The challenge is always convincing the people in charge to allocate sometimes sparse youth work resources into new approaches. It is however fortunate that implementation of maker approaches and methods doesn't necessarily require major investments right from the start; it might even be wiser to start out slowly and try incorporating elements involving making, electronic tinkering kits, robot sets etc. into the current flow of daily youth work and build onward (no pun intended) from there. With learning-by-doing and playful experimentation at their core, makerspaces are an excellent avenue for all youth workers and other educators to co-learn alongside their youngsters. Maker methods can also be an excellent way of engaging learners of all ages into complex subjects and a great way of helping them build confidence in their capabilities.

Finally, to any youth work practitioner who has read this far but still holding a view of Makerspaces and Maker methods being relevant to only a small minority of young people, I would like you to consider two quotes from the perspective of youth work goals:

"The first element is a dedicated space where kids know that they can be safe, be creative, and have autonomy, and we've seen that they really take ownership.¹⁹" Although this is one definition of a Makerspace, it could just as well refer to a local youth centre.

One outspoken Maker activist sums up the significance of Maker culture along the following lines: *"We grow up thinking we are not great. [...] When you experiment with something and it fails but eventually you succeed, it gives you this resiliency and I think more and more people are just coming awake to the idea that they can change the world."*²⁰



Our exceptional group of makers assembled in the lobby of Base1 for the mBot challenge on Day 1.

Pictured from the left: Nikola Tanev (Bulgaria), Camilla Nord (Finland), Mikko Turunen (Finland), Melisa Martinez Ciaurri (Spain), Alexandra Dyankova (Bulgaria), Dražen Petričević (Croatia), Carlos Alcobia (Portugal), Emelie Hanström (Finland), Tomasz Moleda (Poland), Ville Kukkurainen (Finland), Beata Dziejczak (Poland), Guusje Smit (Netherlands), David Allistone (United Kingdom), Anita Krajčec (Croatia), Sára Fleischer (Hungary), Nadine Schirtz (Luxembourg), Robert Schommer (Luxembourg), Anita Zych (Poland), Jessica Reinsch (Germany), Alessio Tiravento (Italy) and Burak Berk Doluay (Cyprus). Missing from the picture is Alexandre Boutaud (France).

¹⁹ https://www.openeducationeuropa.eu/sites/default/files/legacy_files/asset/Learning%20in%20cyber-physical%20worlds_in-depth_39_2.pdf

²⁰ Bre Pettis, founder of Makerbot <http://www.tweaktown.com/articles/5301/what-is-a-maker-what-it-really-means-to-be-a-maker-/index.html>