Tinkering EU: Addressing the Adults

Exploring Tinkering with adult learners: What we learned

A guide for museums and other informal learning and science engagement organizations



Exploring Tinkering with adult learners: What we learned

The project

Tinkering EU: Addressing the Adults explores the potential of the Tinkering approach when working with and for adults in vulnerable situations. It aims to increase engagement with science, especially amongst those who believe that "Science is not for me"; and to build on the Science Capital and the 21st century skills of adult learners. To do so, the project focuses on Equity and **Inclusion** and uses Tinkering as an inclusive learning approach to STEM engagement. We have embraced the concept of 'allyship' whereby partners sought to create meaningful experiences with and for the participants. A key part was working in partnership with local community development organisations who helped us actively listen to, learn from, and become more representative of the participants, increasing the potential impact of each local project in relation to social inclusion. Tinkering activity design and facilitation methods were tweaked to create personally meaningful, inspiring and engaging learning experiences to help develop individuals' engagement and confidence with STEM.

http://www.museoscienza.it/tinkering-eu3/

Tinkering with tinkering

This project has come a long way, it is the third in a row: we started with **Tinkering: Contemporary Education for Innovators of Tomorrow** (2014-2017) by exploring Tinkering as pedagogy to discover the power

of "becoming one with what I am doing"; moved on Tinkering EU: Building Science Capital for ALL (2017-2020) that connected Tinkering with Science Capital as a way to address and engage all learners; while Tinkering EU: Addressing the adults, being true to the pedagogy, wants to support adults to develop a tinkering mindset – both learners and those who are responsible for someone else's thinking and learning experience. We often found ourselves exploring and reflecting on the intersection of 'Tinkering' (with capital T) – that is, the set of activities designed by the Tinkering Studio and the first Tinkering EU project, which built on the Learning Dimensions – and 'tinkering' as an attitude characterizing a whole range of experiences that promote open-ended creative explorations as a way to create what Edith Ackermann called "a conversation with the material"², to build one's own relationship to learning itself, and one's own meaning from the engagement with STEM.

The resource: what it is and how to navigate

This document gathers the ultimate reflections from the project partners. It comprises an agile tool for those interested in exploring the potential of Tinkering for inclusive learning and engagement. It presents lessons learned about:

 co-design and development of activities with local communities as a way to create equitable and inclusive spaces and experiences

- the core elements that helped shape the relationship with the communities (from knowing each other, to co-designing, to testing and implementation)
- the contribution of the project to institutional change at wider level through the reflective cases.

The 'Map of Equity and Inclusion through Tinkering Activities' summarises the ways the activities can be considered equitable and inclusive under four themes: Upskilling, Personal Narrative and Expression, Connections to Everyday Life and Approach. Each box contains reflections on the activities designed by different partners. In addition, links to additional resources, accessible and usable independently one from the other, facilitate deeper dives into the different concepts and processes. By clicking on the partner's name, you can access reflections from the partners about creating longer term impact and institutional change; by clicking on the activity title, you can access the process undertaken by each partner for the development of the activity (from the beginning of the collaboration to production) that supports Equity and Inclusion. These materials are based on interviews carried out with the museum practitioners who tinkered with Tinkering. They summarise theoretical and practical learning emerging from each community-based project that is cascading into wider organisational practice. We hope these practical examples and reflections provide insights and inspiration for science centre and museum practitioners who are considering developing these sorts of approaches to help create more equitable STEM experiences for adult learners in their own organisations.

¹ Papert, S., (2000), 'What's the big idea? Toward a pedagogy of idea power', IBM Systems Journal, 39(3-4) 720-729.

² Ackermann, E., (2011) 'The craftman, the trickster and the poet. Re-souling the rational mind', MIT. https://mit.academia.edu/EdithAckermann

Map of inclusion through Tinkering activities

Learning to program through playful exploration helped make technology more accessible.

Send a message

NEMO Science Museum

Using familiar materials to prompt the exploration of less familiar ones contributed to understanding STEMoriented contents.

Interweaving

NEMO Science Museum

Developing skills in designing and building things made adults feel valued

Building cardboard furniture

UPSKILLING

Copernicus Science Center

Using familiar elements (sounds and noises) contributed to strengthen self-esteem and the development of emotional intelligence.

Tinkering with sound TRACES

Bringing one's own meaningful objects into the Tinkering process helped create a space for personal storytelling, personalise the experience and reaffirm personal identities

Chain Reaction and Light Play Museo Nazionale Scienza e Tecnologia

Leonardo da Vinci

Artifacts were a way to say something about oneself (a story, a wish, a dream) and became contexts for personal expression.

Send a message **NEMO Science Museum**

Wishcard ScienceCenter-Netzwerk

Helping emerge the richness and diversity of the historical and cultural backgrounds of the participants contributed to reinforce intercultural dialogue and exchange.

Dveing with natural materials ScienceCenter-Netzwerk

Revising activities under the light of the current situation (pandemic, working/learning from home etc.) can increase their appeal for adult learners.

Building cardboard furniture and Home garden Copernicus Science Center

TRACES

Use and exploration of

the senses contributed to

Tinkering with sound

developing emotional thinking.

Building on the language aspect of the activity contributed to the development of self-confidence in using and mastering language for not native speakers.

Wishcard and Dyeing with natural materials

ScienceCenter-Netzwerk

Exploring technology and electronicoriented contents and using creative exploration and expression through art helped build skills potentially useful for the labour market.

Dismantling and merging electronic toys

TRACES

Using complexification - from the "simpler" exploration to a more complex engagement with stuff created a context of progressive

Dismantling and merging electronic toys **TRACES**

confidence to address STEM-

oriented contents.

Learning how to program helped build selfconfidence and interpersonal skills.

Send a message NEMO Science Museum PERSONAL NARRATIVE AND EXPRESSION: creating a sense of belonging

Technology was used as a means and a context for personal expression and meaningful making.

Send a message **NEMO Science Museum**

Being sensitive towards the adult learners' wishes to express themselves in writing and to create unique designs.

Wishcard

ScienceCenter-Netzwerk

Sharing and exchanging ideas and processes of work encouraged and reinforced personal identity and a sense of belonging to the

group.

Send a message NEMO Science Museum

Promoting tailor-made experiences can increase the attractivity of the activities.

Building cardboard furniture

Copernicus Science Center

Promoting equitable and inclusive engagement with science for disadvantaged adults through...

Listening to the needs of adult learners helped build an authentically tailor-made activity.

Building cardboard forniture Copernicus Science Center

Chain Reaction and Light Play

Museo Nazionale Scienza e Tecnologia Leonardo da Vinci

Engaging artists attributed an additional importance to the experience and to the work done

Interweaving

NEMO Science

Personal agency in the choice of how to approach the exploration of STEMoriented topics helped create a more interest-driven and solid bond with contents.

Dismantling and merging electronic tovs

TRACES

Meetings during the design and development process helped build trust and to identify participants' interests, prior knowledge and experiences.

Dyeing with natural materials ScienceCenter-Netzwerk

> **APPROACH** in engaging and in facilitating new roles and collaboration

To establish a relevant bond with the participants, it is important to acknowledge and to rely on community leaders' expertise.

Send a message Interweaving

NEMO Science Museum

Creating a situation of continuous exchange between those who participate and those who facilitate means that the usual hierarchies - facilitator vs participant/ learner - are not only challenged but not applied at all.

ScienceCenter-Netzwerk

CONNECTIONS TO EVERYDAY LIFE

Choosing a topic that resonates with the participants' experience realm can be a means to introduce STEM-oriented contents.

Dyeing with natural materials ScienceCenter-Netzwerk

Both process and end product became the contexts for participants to integrate 'techniques' they already knew.

Having a low threshold

NEMO Science Museum

Interweaving

increases the replicability of

the activity in other contexts

repeat it themselves at home.

and encourages participants to

Dyeing with natural materials ScienceCenter-Netzwerk

The topic was chosen with the intention to provide participants with a meaningful experience and the opportunity to 'enter' the activity with no need for pre-acquired knowledge.

Building cardboard furniture

Copernicus Science Center

The opportunity to bring and add personal objects into what participants create reinforced the links with their everyday

Light Play and Chain Reaction

Museo Nazionale Scienza e Tecnologia Leonardo da Vinci

Dveing with natural materials

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All considerations reported here emerge from 3-year work engaging nine different community associations locally placed in six European countries and approximately 600 adult learners. They are to be considered as lessons learned from an experience that took place in a very specific framework and are not to be intended as research results.

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CENTRIM NAUKI KOPERMIK

MUSEO NAZIONALE SCIENZA E TECNOLOGIA LEONARDO DA VINCI







