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Entrepreneurial skills
for young social innovators
in an open digital world

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DOIT-Europe.Net

Dr. Sandra Schön, Salzburg Research

Entrepreneurial skills for young social innovators from 6 to 16 years

23rd January 2020, Social Innovation Seminar
ERCEA/REA, European Commission, Brussels

- Closing RESEARCH gap concerning early entrepreneurial education with 1.000 children

- DEVELOPMENT of tools for 6 to 16 years olds and facilitators

- POLICY development support
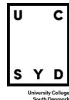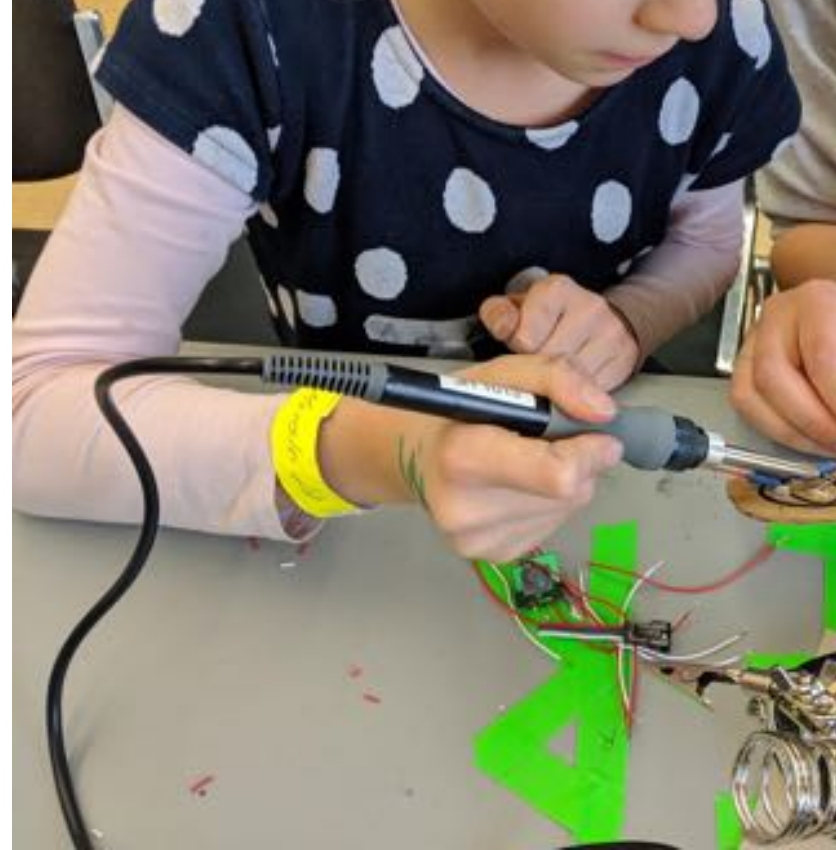
Duration: 10/2017-09/2020
Grant: EC Horizon 2020 Research & Innovation Action 770063 (2,4 million)
Webpage: http://DOIT-Europe.net

EARLY ENTREPRENEURIAL EDUCATION (6 TO 16 Y)

Entrepreneurial Education

Develop the skills and mind-set which allow people to turn creative ideas into entrepreneurial action

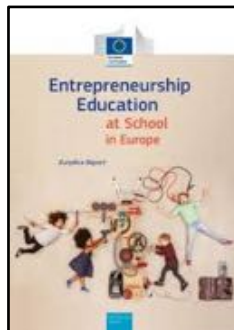European Commission's Thematic Working Group on Entrepreneurship Education

EARLY ENTREPRENEURIAL EDUCATION

EC (2012): Rethinking Education

Requests: Provide at least one practical entrepreneurial experience in school

EC (2016): Eurydice Report

Assessed: Low levels of practical entrepreneurial learning in schools

JRC (2016) EntreComp

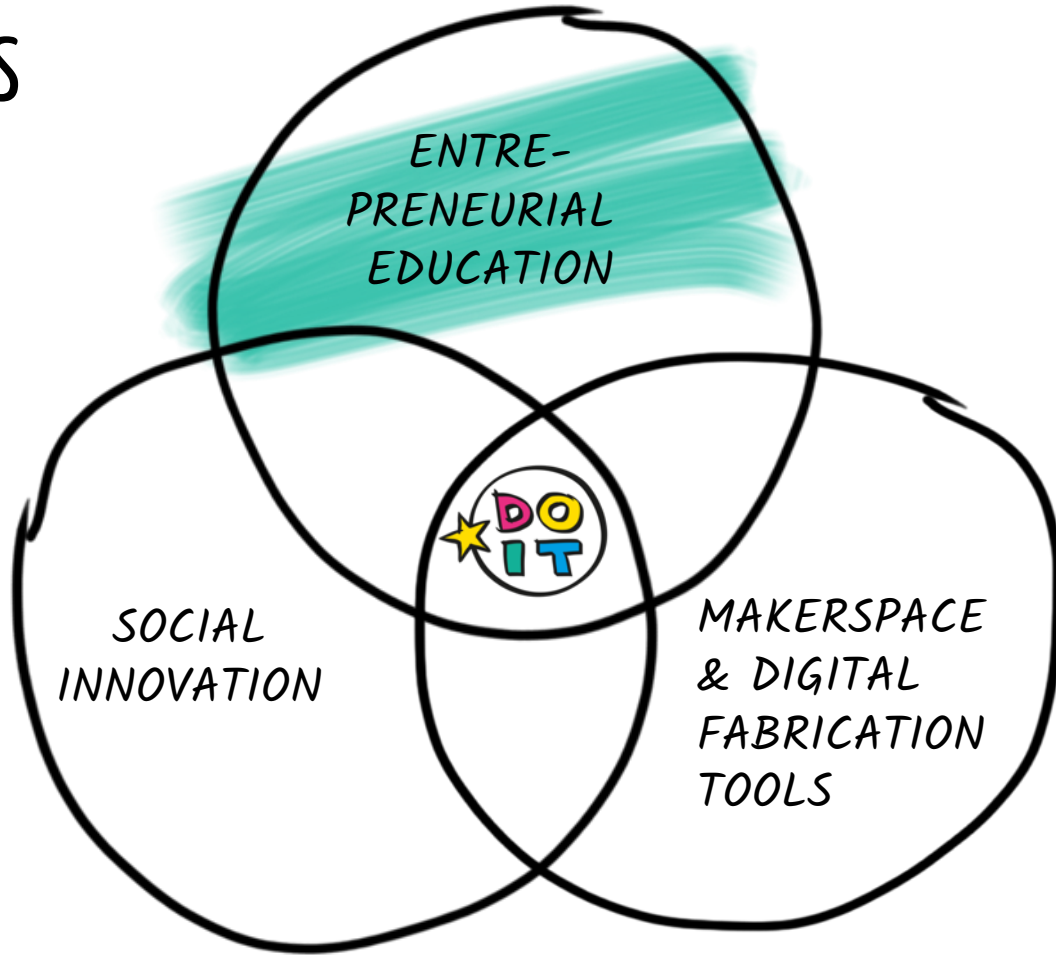Identified: Important skills of (adult) entrepreneurs: e.g. **self-efficacy, creativity**

Status quo in 2017
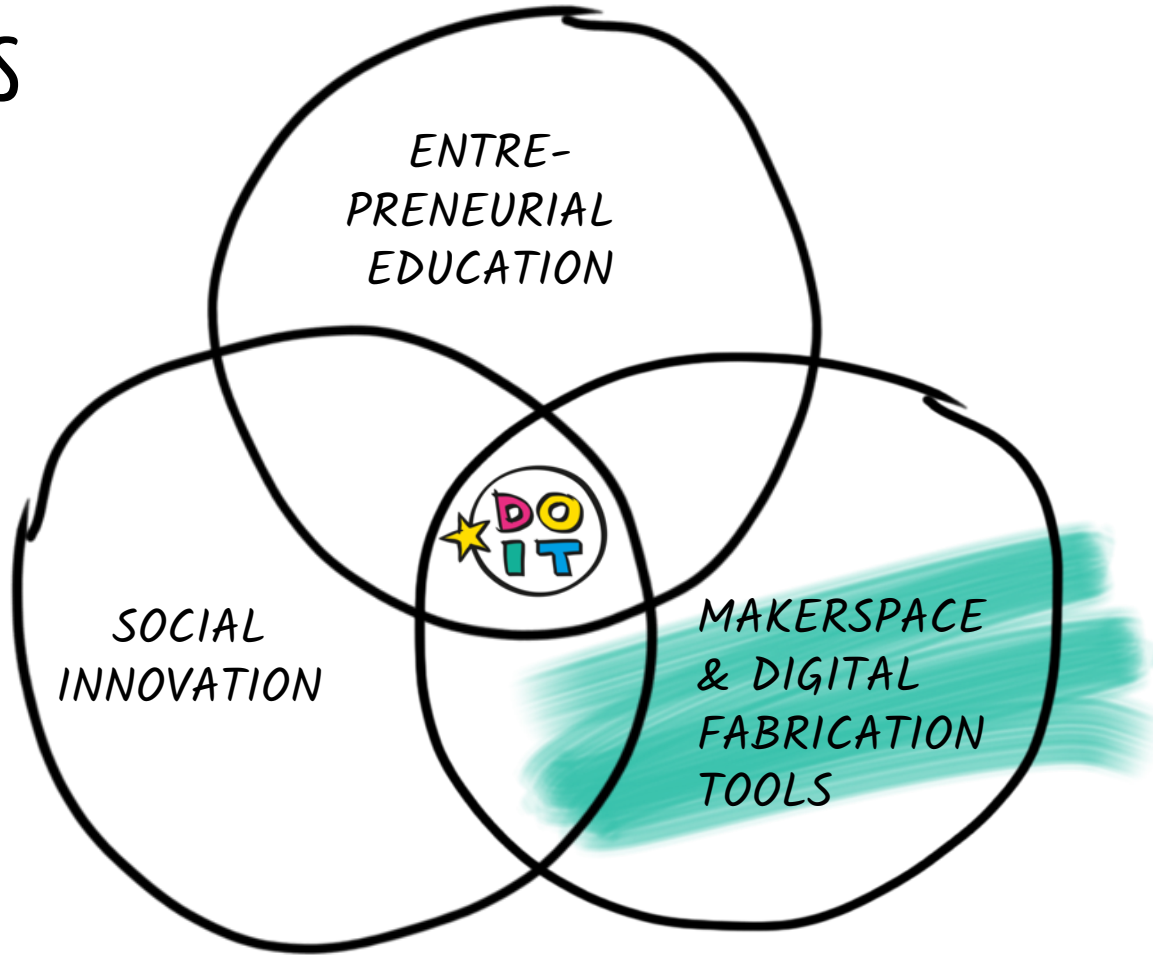

Research gap: Effect of practical education on 6 to 16 years olds (making)

THE DOIT LEARNING APPROACH

THE 3 FACETS OF THE DOIT LEARNING APPROACH

ENTRE-PRENEURIAL EDUCATION

SOCIAL INNOVATION

MAKERSPACE & DIGITAL FABRICATION TOOLS

THE 3 FACETS OF THE DOIT LEARNING APPROACH

ENTRE-PRENEURIAL EDUCATION

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SOCIAL INNOVATION

MAKERSPACE & DIGITAL FABRICATION TOOLS

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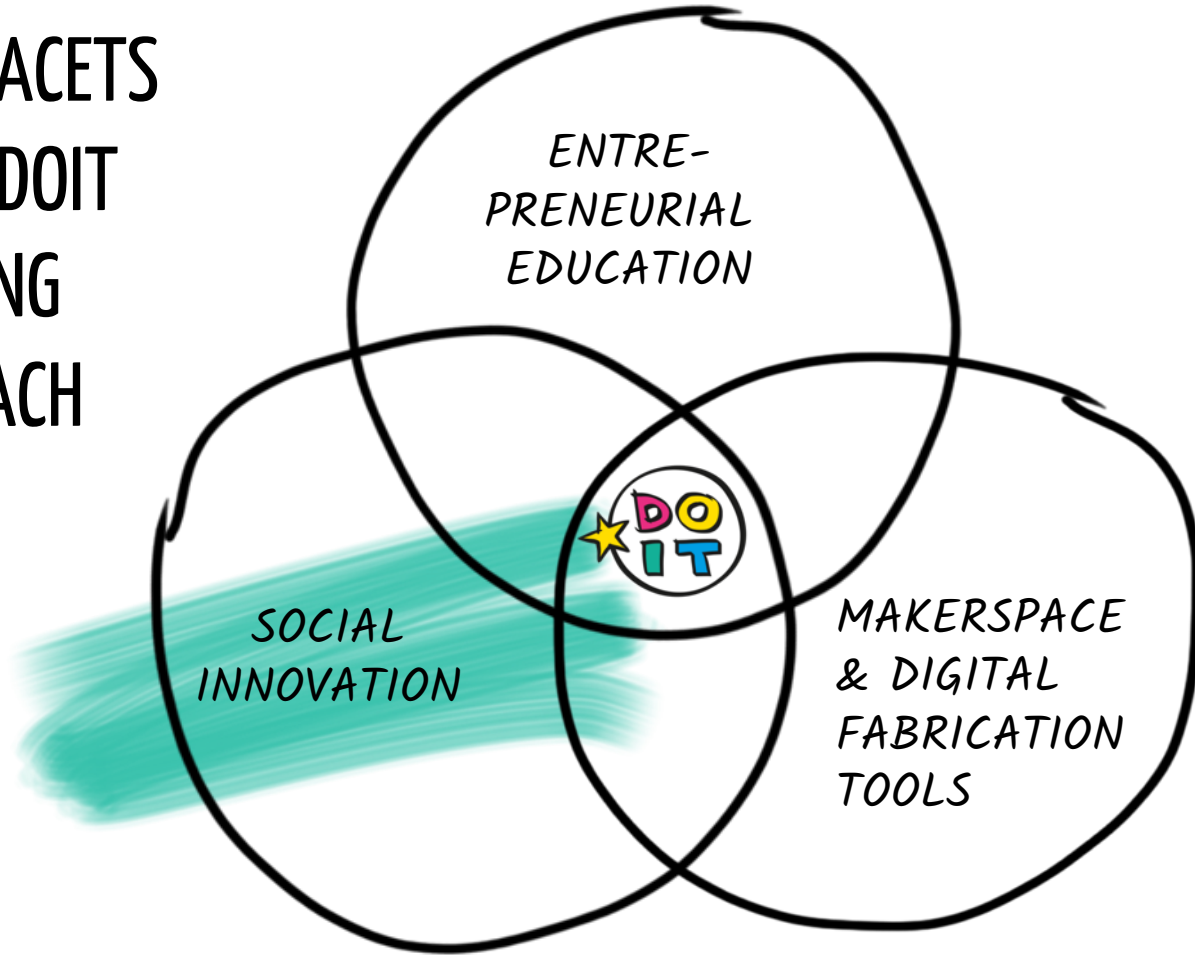# Makerspace

Open learning space with digital fabrication tools for co-design and prototyping

THE 3 FACETS OF THE DOIT LEARNING APPROACH

ENTRE-PRENEURIAL EDUCATION

SOCIAL INNOVATION

MAKERSPACE & DIGITAL FABRICATION TOOLS

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Social Innovation

New ideas that work to meet pressing unmet needs and improve peoples' lives

Geoff Mulgan et al. 2007. Social Innovation. What it is, why it matters and how it can be accelerated. Skoll Centre for Social Entrepreneurship

OBJECTIVE OF THE DOIT LEARNING PROGRAM

To support the development of all skills at a young age that are useful in an innovation project:

- Identifying social needs,
- joint development and design,
- prototyping, and dissemination of the idea or solution.

THE DOIT LEARNING PROGRAM
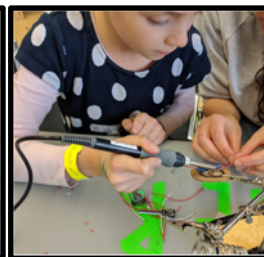
7 ELEMENTS FOR YOUNG SOCIAL INNOVATORS

SENSITISE   **EXPLORE**   **WORK TOGETHER**   **CREATE**   **REFLECT**   **SCALE-UP**   **SHARE**

SELECTED RESULTS

MORE THAN 500 CO-DESIGNED PROTOTYPES
TECHNOLOGY-BASED AND SOCIALLY RESPONSIBLE

Toilet Water Alarm, developed by MaCha

Massage Belt, developed by Yeet

Hydroelectric Power Station Alarm System, developed by The Water Watchers

Green Keeper Alarm, developed by The Football Girls
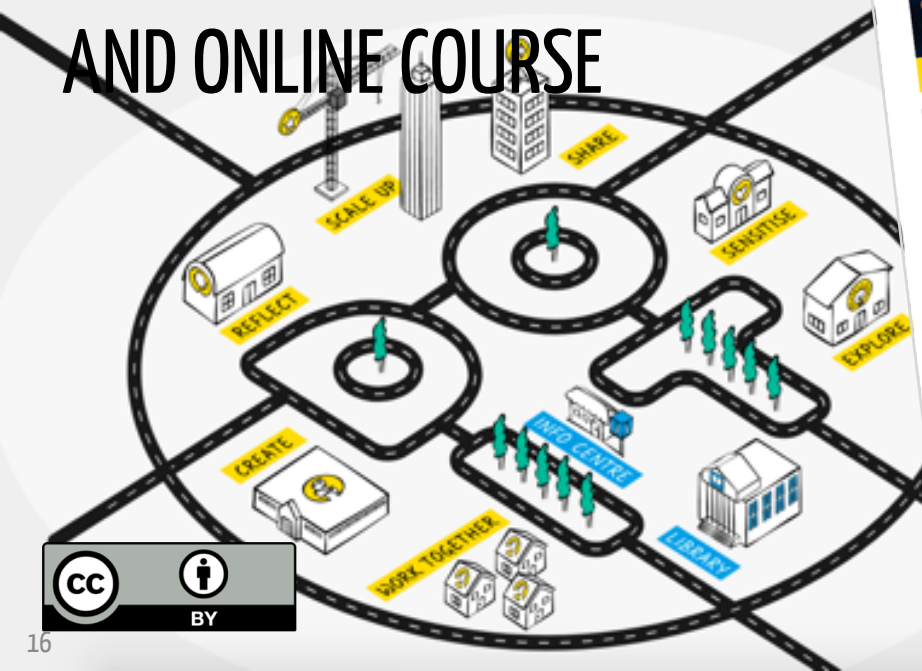

Sensitive Jacket, developed by the Breathtaking Team

Acoustic Pollution in the School, developed by Noise

100 MATERIALS AND TRAINED FACILITATORS

THE DOIT TOOLBOX, FACILITATOR TRAINING AND ONLINE COURSE

YOUTH ENGAGED IN THE DOIT PROJECT
CO-DESIGNING THE FUTURE OF EDUCATION

A girl, 14 years, talking about children's participation at school. (PM2, Billund, 03/2018)

Changing roles: 2 boys, 14 and 15 years, hosting a maker workshop for our consortium (PM2, Barcelona, 08/ 2018)

RESEARCH

EVALUATION DESIGN

In 10 countries and with 1.002 children
(47 %female, 52% male, 1% missing/other)
AT, BE, DE, DK, ES, FI, HR, NL, SI, SR
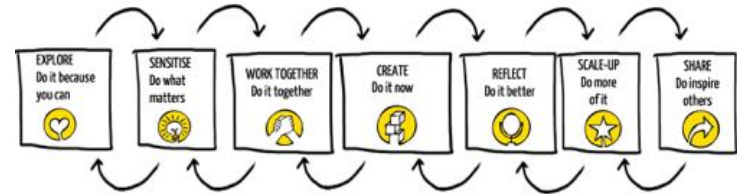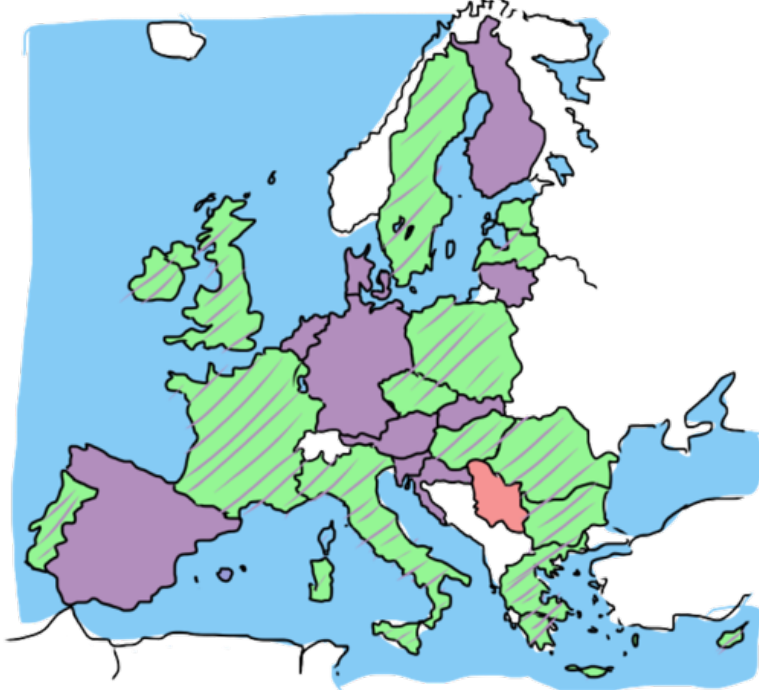
Each pilot had at least 15 working hours and is built upon the DOIT program

Evaluated skills of children: Self-efficacy, creativity, teamwork and others (tests, interviews etc.)

Diverse settings:
- Age range: 6-10 (30%), 11-16 (67%) years (3% m.d.)
- Span of actions from 2,5 days to 4 months
- in schools (79%), outside schools (21%)
- in fablabs and mobile makerspaces
- diverse topics (UN SDG)

CREATIVITIY
MODERATE SIGNIFICANT INCREASE

Results of standardized tests at the start and after the pilots. We used the TSD-Z test for creativity by Urban & Jellen (2010) (N=633, p=0,000).

Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). Evaluation results pilot phase 2, Deliverable 6.9 of the Horizon 2020 project DOIT, EC grant agreement no 770063, Vienna, Austria: Zentrum für Soziale Innovation. CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063

CREATIVITIY
OLDER GROUP (11-16) BENEFITTED MORE

Results of standardized tests at the start and after the pilots. We used the TSD-Z test for creativity by Urban & Jellen (2010) (N1=178, N2=441, significant difference of the post-test).

Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). Evaluation results pilot phase 2, Deliverable 6.9 of the Horizon 2020 project DOIT, EC grant agreement no 770063, Vienna, Austria: Zentrum für Soziale Innovation. CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063

CREATIVITIY
GIRLS BENEFITTED EVEN MORE

Results of standardized tests at the start and after the pilots. We used the TSD-Z test for creativity by Urban & Jellen (2010) (Nf=294, Nm=338, significant difference of the post-test).

Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). Evaluation results pilot phase 2, Deliverable 6.9 of the Horizon 2020 project DOIT, EC grant agreement no 770063, Vienna, Austria: Zentrum für Soziale Innovation. CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063
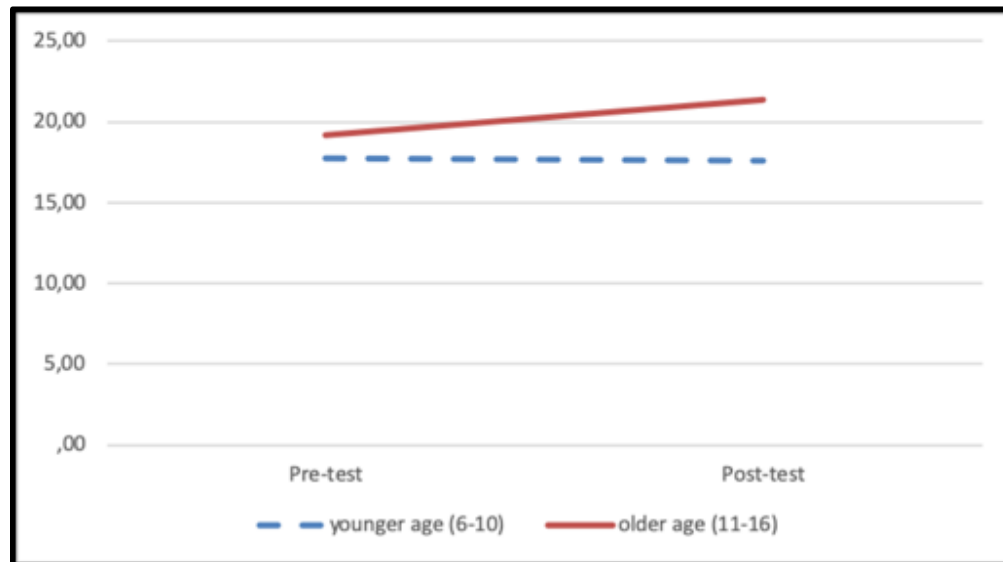

22
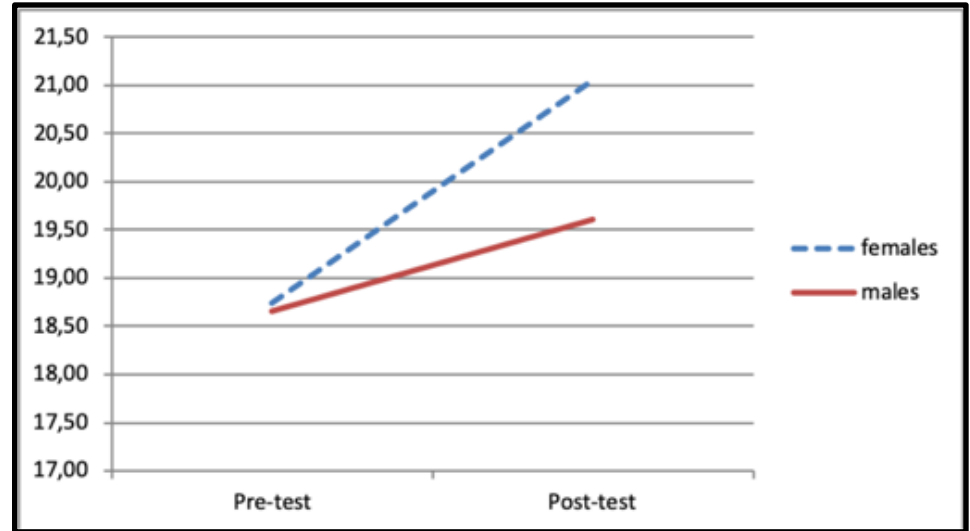
SELF-EFFICACY
MODERATE SIGNIFICANT INCREASE

Results of standardized tests at the start and after the pilots. We developed a questionnaire on self-efficacy and entrepreneurial intention (N=751, p=0.000).
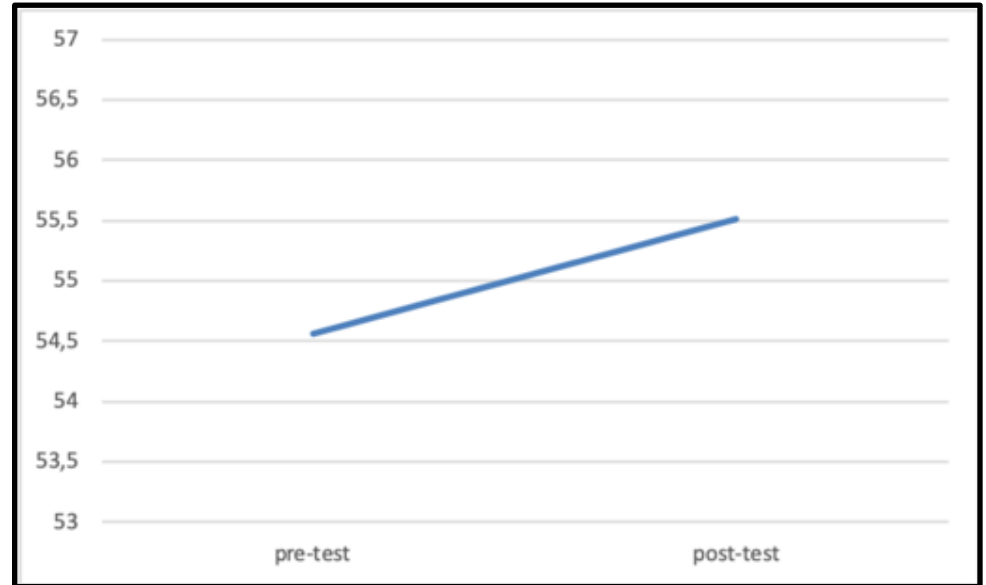
Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063

SELF-EFFICACY
BOTH AGE GROUPS BENEFITTED

Results of standardized tests at the start and after the pilots. We developed a questionnaire on self-efficacy and entrepreneurial intention (N1=208, N2=555).

Programs without makerspaces report a decrease of self-efficacy regarding entrepreneurial intentions, e.g. BizWorld 5-day training course in primary schools (Rosendahl-Huber et al. 2012); 'mini-company' programme for college students (Oosterbeek et al. 2010).
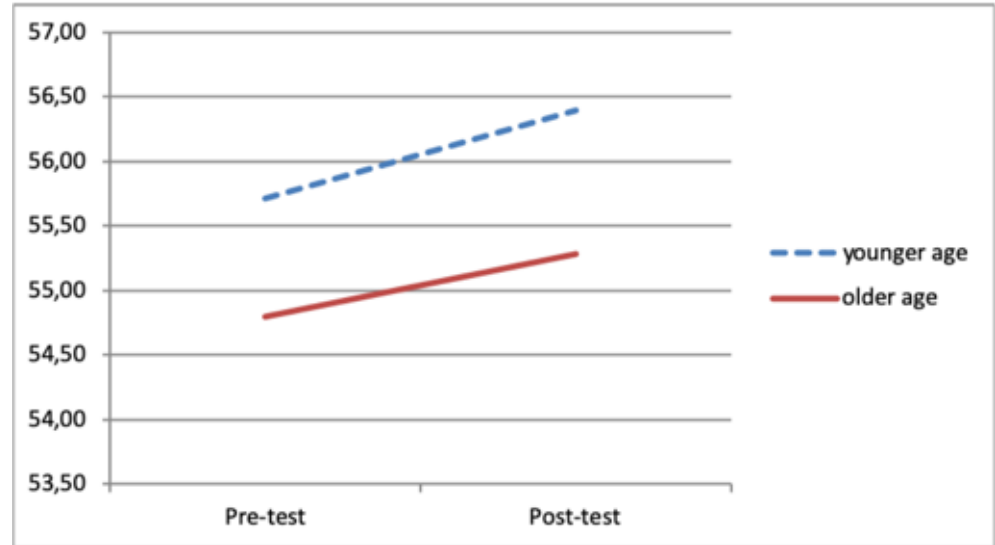
Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063

SELF-EFFICACY
SIGNIFICANT GENDER DIFFERENCES

Results of standardized tests at the start and after the pilots. We developed a questionnaire on self-efficacy and entrepreneurial intention (Nf=371, Nm=404).

Source: Unterfrauner, E., Hofer, M. & Voigt, C. (2019). Evaluation results pilot phase 2, Deliverable 6.9 of the Horizon 2020 project DOIT, EC grant agreement no 770063, Vienna, Austria: Zentrum für Soziale Innovation. CC BY 4.0 DOIT – http://DOIT-Europe.net, H2020-770063
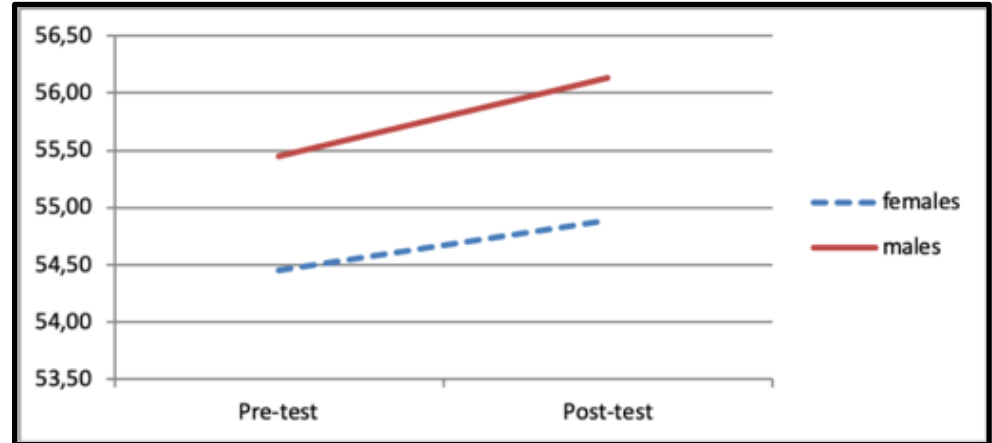
MEASURES TO REACH GIRLS
AND TO PREVENT STEREOTYPIC BEHAVIOR

Announce activity gender-sensitively	Set girls' quota and low tresholds	Integrate female tutors and role models	Give collaborative prompts and assignments	Apply gender mainstreaming in makerspace
Preparation of the Activity		**Activity**		
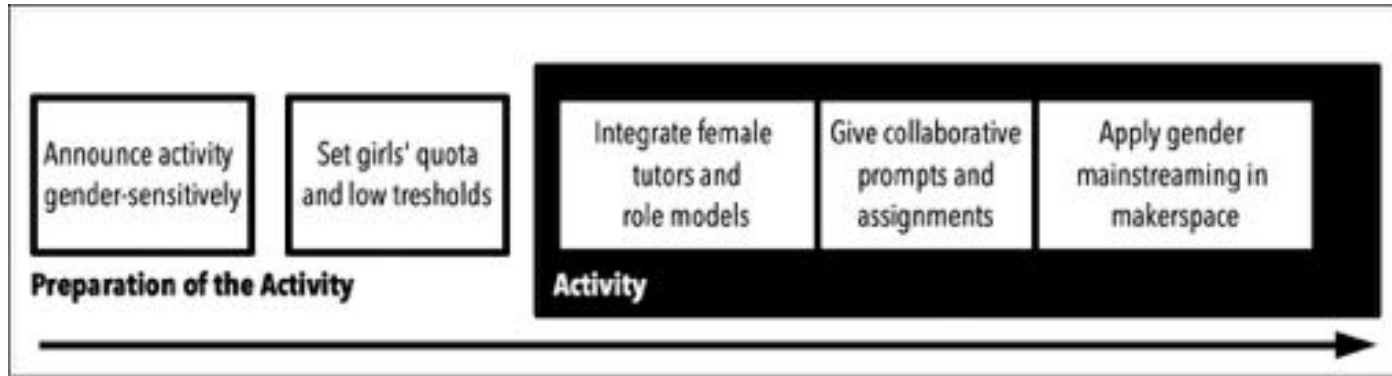
Overview: Guidelines to reach girls in makerspace settings - Recommendations based on literature research and own experiences (Source: Schön et al. (2020), Fig. 1)

Source: Schön S., Rosenova M., Ebner M., Grandl M. (2020). How to Support Girls' Participation at Projects in Makerspace Settings. Overview on Current Recommendations. In: Moro M., Alimisis D., Iocchi L. (eds) Educational Robotics in the Context of the Maker Movement. Edurobotics 2018. Advances in Intelligent Systems and Computing, vol 946. Springer, Cham

POLICY CHALLENGE & RECOMMENDATION

SYSTEM COMPATIBILITY: 0?

REASONS:
- Interdisciplinary
- No blue prints for single lessons
- Open learning approach
- Cooperating with external people and organisations
- Need of own space and use of technologies

DOIT ACTIVE IN POLICY DEVELOPMENT
CO-DESIGNING THE AUSTRIAN ACTION PLAN

DOIT is part of Austrian working group which develops the „National Action Plan Entrepreneurship Education"

Federal Ministry
Republic of Austria
Education, Science
and Research

INITIATIVE FOR TEACHING ENTREPRENEURSHIP
ifte.at

Federal Ministry
Republic of Austria
Digital and
Economic Affairs

Bundesministerium
Digitalisierung und
Wirtschaftsstandort

Das Bundesministerium lädt zur Stzung ein

Plattform Entrepreneurship
Aktionsplan für
Entrepreneurship Education

Mittwoch, 13. November 2019,
im Haus der Industrie

IDEA

Illustrations © National working group

A DOIT EXPERIENCE FOR EVERY CHILD
OUR KEY GOAL FOR EDUCATION POLICY

All young people should benefit from at least one practical entrepreneurial experience before leaving compulsory education.

Children should have the opportunity

- To experience being an social innovator through
- Developing an innovative prototype or solution
- for a relevant societal topic (UN Sustainability Goal),
- Co-designing with others and reflecting
- In a makerspace, i.e. an open learning setting with digital fabrication tools
- And publicly presenting the result and lessons learned

See EC rec. Rethinking Education (2012), Council rec. Key Competences (2018, 2.5)

DOIT RECOMMENDATIONS
FOR FUTURE ENTREPRENEURIAL EDUCATION POLICY

1. Raise awareness of the ==potential of makerspaces as learning environments for practice-based development== of digital, social and entrepreneurial skilled young people.

2. ==Expand the number of pilot makerspaces (infrastructure)== in schools and increase the number of social entrepreneurial programmes in makerspaces.

3. ==Promote maker education== with a ==focus on social== and entrepreneurial mind-sets and skills.

4. Support collaboration of ==teacher trainings== and local maker communities a.

DOIT'S first EC Policy Brief

EUROPEAN
POLICYBRIEF

Education of young people for social innovation and entrepreneurial practices in makerspaces

DOIT RECOMMENDATION ON MAKERSPACES

INCREASE PROGRAMS IN EXISTING MAKERSPACES

Possible short-term

- Over 1600 makerspaces exist already in the EU28+Serbia (690 FabLabs, 533 Hackerspaces, 400 Other spaces)*

- Often with educational activities

- Training of facilitators needed

- Fast impact: e.g. 1000 spaces x 300 children/y = 300,000 children/year

* Fab Labs, https://www.fablabs.io/labs;
Hackerspaces, https://wiki.hackerspaces.org (those marked as active); Other spaces, e.g. in community centres, libraries, museums (estimate based on various sources)

EXPAND THE NUMBER OF PILOT MAKERSPACES AT SCHOOLS

Long-term

- At an early stage

- Some pioneering schools (e.g. Nordic countries)

- Pilots in some countries (projects with 40-100 schools, no fixed makerspaces)**

- Requires infrastructure in schools

- Training of teachers

- Slow impact (5-10 years)

** e.g. Maker@Scuola, IT, 2014-2018, 100 nursery and primary schools; Makerskola, SE, 2015-2018, 40 nursery, primary, secondary and special education schools

INVITATION

INVITATION

DOIT FINAL CONFERENCE

Making Social Innovators
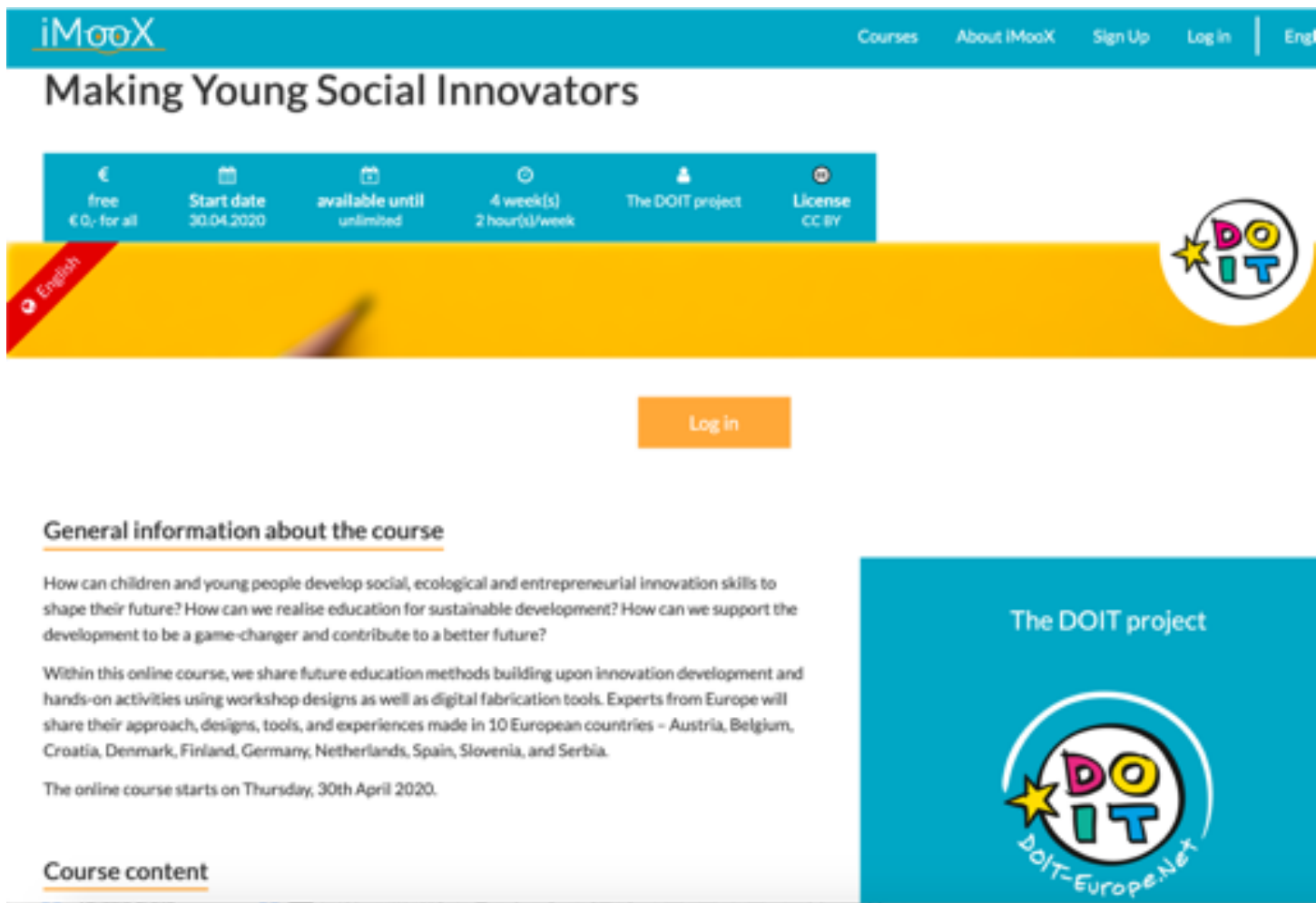European Conference on Youth Innovation Education in Makerspaces

19. & 20. März 2020 im Konferenzzentrum St. Virgil, Salzburg

INVITATION

FREE DOIT ONLINE COURSE

see http://imoox.eu

iMooX

Courses   About iMooX   Sign Up   Log in | Engl

Making Young Social Innovators

| € free €0,- for all | Start date 30.04.2020 | available until unlimited | 4 week(s) 2 hour(s)/week | The DOIT project | License CC BY |

English

Log in

General information about the course

How can children and young people develop social, ecological and entrepreneurial innovation skills to shape their future? How can we realise education for sustainable development? How can we support the development to be a game-changer and contribute to a better future?

Within this online course, we share future education methods building upon innovation development and hands-on activities using workshop designs as well as digital fabrication tools. Experts from Europe will share their approach, designs, tools, and experiences made in 10 European countries – Austria, Belgium, Croatia, Denmark, Finland, Germany, Netherlands, Spain, Slovenia, and Serbia.

The online course starts on Thursday, 30th April 2020.

Course content

The DOIT project

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Sharing is caring!

DOIT Consortium

MORE DOIT PUBLICATIONS
SEE ALSO

- Hornung-Prähauser, Veronika; Schön, Sandra; Teplov, Roman; Podmetina, Daria (2018). **Social Innovation Training in Makerspaces with the new DOIT approach**. In: Proceedings of the ISPIM conference 2018 in Stockholm, Manchester: The International Society for Professional Innovation Management (ISPIM), pp. 1-15. URL:https://search.proquest.com/openview/71360b2ead63abfbf01a4f9aae907c91/1?pq-origsite=gscholar&cbl=2040562, Preliminary version: https://www.doit-europe.net/wp-content/uploads/ISPIM-2018-Preliminary-version.pdf

- Schön, Sandra; Jagrikova, Radovana & Voigt, Christian (2018). **Social innovations within makerspace settings for early entrepreneurial education – The DOIT project**. In T. Bastiaens, J. Van Braak, M. Brown, L. Cantoni, M. Castro, R. Christensen, G. Davidson-Shivers, K. DePryck, M. Ebner, M. Fominykh, C. Fulford, S. Hatzipanagos, G. Knezek, K. Kreijns, G. Marks, E. Sointu, E. Korsgaard Sorensen, J. Viteli, J. Voogt, P. Weber, E. Weippl & O. Zawacki-Richter (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 1716-1725), retrieval date, from https://www.learntechlib.org/primary/p/184401/.Preliminary version: https://www.doit-europe.net/wp-content/uploads/DOIT-EdMedia-DOIT-project-preliminary-version.pdf

- Unterfrauner, Elisabeth; Voigt, Christian & Schön, Sandra (2019). **Towards a Model of Early Entrepreneurial Education: Appreciation, Facilitation and Evaluation**. In Di Mascio, T., Vittorini, P., Gennari, R., De la Prieta, F., Rodríguez, S., Temperini, M., Azambuja Silveira, R., Popescu, E., Lancia, L. (Eds.), Methodologies and Intelligent Systems for Technology Enhanced Learning, 8th International Conference (pp. 139-146), retrieval date, from https://link.springer.com/book/10.1007%2F978-3-319-98872-6. Preliminary version: https://www.doit-europe.net/wp-content/uploads/DOIT-MisTEL-2018-Preliminary-Fraunhofer-et-al..pdf

- Geser, G., Schön, S. & Ebner, M. (2019). **Business models for Open Educational Resources: how to exploit OER after a funded project**? In J. Theo Bastiaens (Ed.), Proceedings of EdMedia + Innovate Learning (pp. 1519-1525). Amsterdam, Netherlands: Association for the Advancement of Computing in Education (AACE). Retrieved July 14, 2019 from https://www.learntechlib.org/primary/p/210171/

- Geser, Guntram; Hollauf, Eva-Maria; Hornung-Prähauser, Veronika; Schön, Sandra; & Vloet, Frank (2019). **Makerspaces as Social Innovation and Entrepreneurship Education Environments: The DOIT Learning Program**. In: Discourse and Communication for Sustainable Education, 2019, 2, pp. 60-71. Open Access: https://www.degruyter.com/dg/viewjournalissue/j$002fdcse.2017.8.issue-1$002fissue-files$002fdcse.2017.8.issue-1.xml

- Voigt, Christian; Unterfrauner, Elisabeth; Aslan, Tame; Hofer, Margit Hofer (2019). **Design Thinking with Children: The Role of Empathy, Creativity and Self-Efficacy**: In: Proceedings of the Fablearn 2019, Publisher: ACM. https://www.researchgate.net/publication/331653915_Design_Thinking_with_Children_The_Role_of_Empathy_Creativity_and_Self-Efficacy