



JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

JYU OKL

Luovan teknologian ja koodaamisen workshop

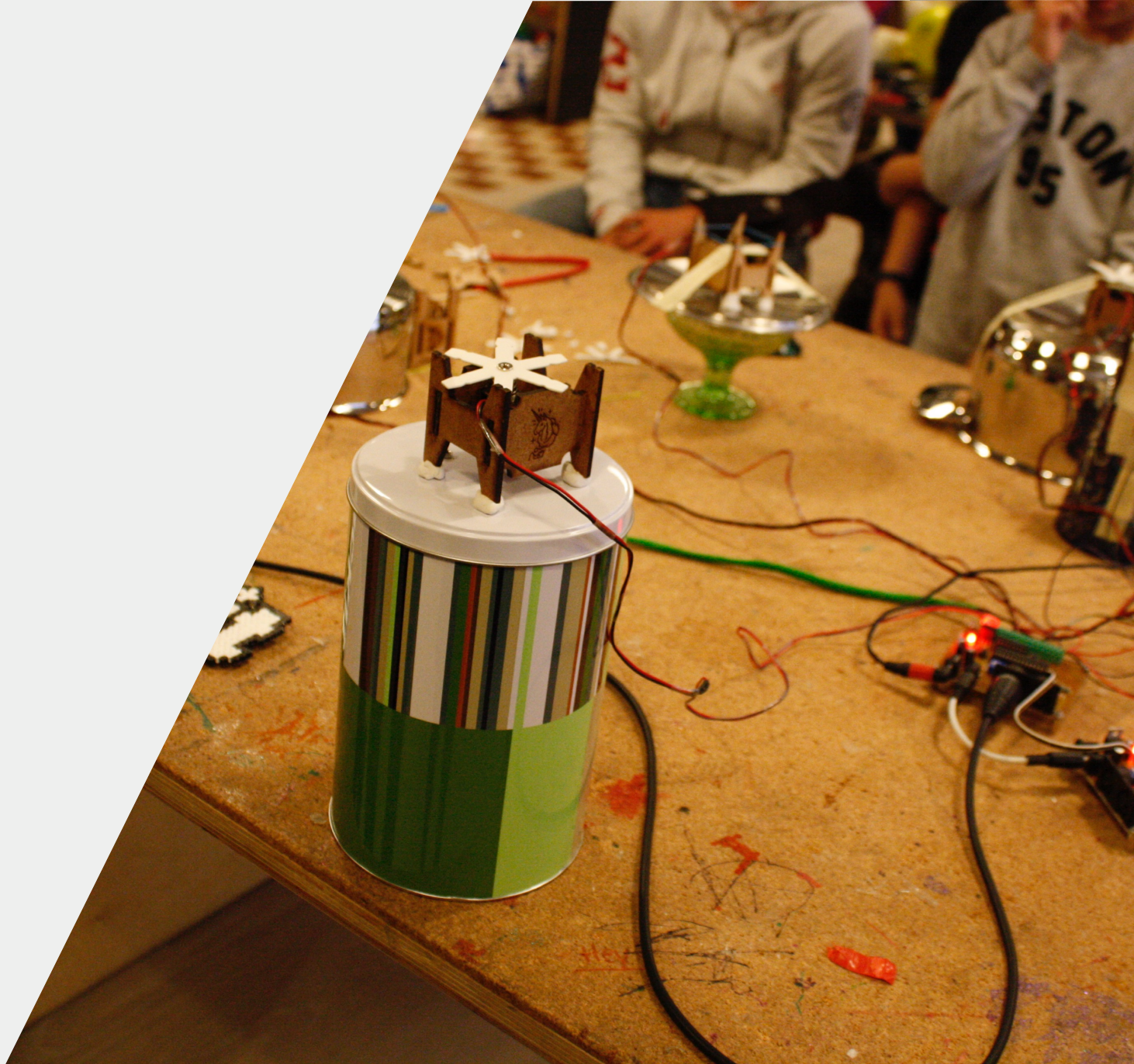
Ville Heilala, FM, KM

Informaatioteknologian tiedekunta



Aamun agenda?

- Höpöttelyä
- Toiminnallista työskentelyä





Maker Movement (suom. värkkääminen)

- In education: STEAM+C
- "Refers broadly to the growing number of people who are engaged in the creative production of artifacts in their daily lives and who find physical and digital forums to share their processes and products with others" (Halverson & Sheridan 2014).
- E.g., Papert (constructionism), Dewey (learning by doing), Freire (critical pedagogy)



Seamour Papert (1928-2016)

- Mathematician, computer scientist and educator at MIT
- Co-inventor of Logo
- Contribution to theories of learning: constructivism (Piaget) + construction
- Constructionism: reconstructing knowledge (instead of transmission) + manipulating materials by constructing meaningful products



Hard Fun (Papert)

- “Every educator must have felt some envy watching children playing video games:
- If only that energy could be mobilized in the service of learning something that the educator values. But the envy can take very different forms.
- Instructionists show their orientation by concretizing the wish as a desire for games that will teach math or spelling or geography or whatever.
- The Constructionist mind is revealed when the wish leads to imagining children making the games instead of just playing them. Rather than wanting games to instruct children they yearn to see children construct games.”



When technology was not so accessible...

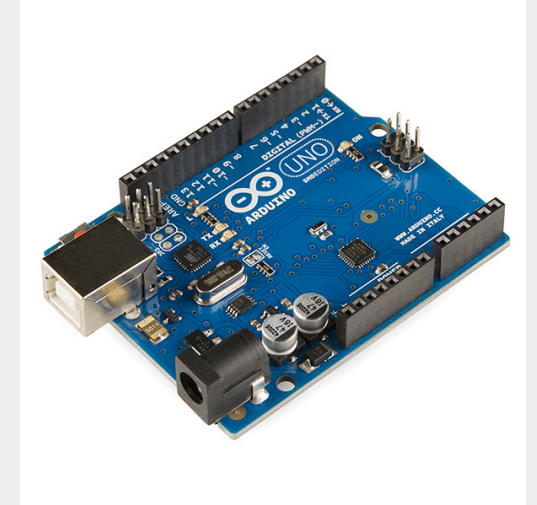
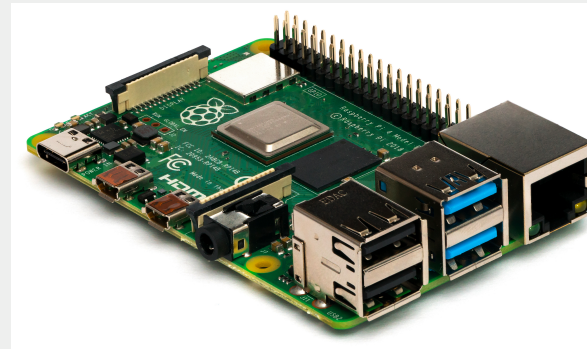
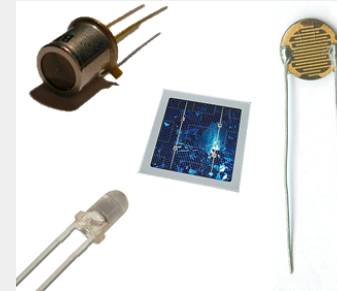
- Among others: Exploratorium (1969), Heureka (1989)





21st Century: Accessible technology

- Computing(!)
- Relatively cheap
- Easy to get
- Usable, extendable
- Abstracting the "real hard stuff"
- Rapid prototyping





2006 Maker Faire

- Dale Dougherty: Make Magazine (inspired by Popular Mechanics)
- Event to "celebrate arts, crafts, engineering, science projects and the Do-It-Yourself (DIY) mindset"





Värkkääminen Suomessa

- Makerspace-tiloja perustettu
- Kirjastoissa, yhdistyksillä, kouluissa tiloja ja välineitä
- Mehackit järjesti 2019 ensimmäinen opettajille suunnattu maksuton täydennyskoulutus verkkokurssina letmehackit.org
- Innokas-verkosto
- Tapahtumia: mm. Värkkäilyfestari 2.0

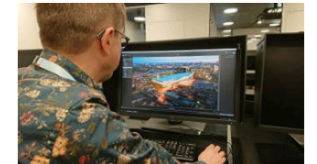
Oodin tilat
Kaupunkiverstas
Esteettömyys
Lasten ja nuorten Oodi



Miten varaan Kaupunkiverstaan tiloja ja laitteita?
Löydät lisätietoa Oodin toisen kerroksen tilojen ja laitteiden varaamisesta täältä.



Oodin soittohuoneet aukeavat!



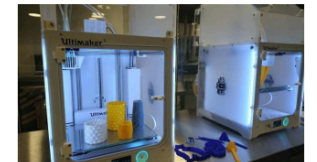
Oodin odotetut mediatyöasemat avautuvat
Oodin mediatyöasemat mahdollistavat monenlaisen luovan työskentelyn.



Hommat etenee Kaupunkiverstaalla!
Kaupunkiverstaan uusiin tulokas on suurkanavatuksin.



Kaupunkiverstaan laitteet
Tietoa Oodin Kaupunkiverstaan monipuolisista palveluista!



Oodin toinen kerros on tekemisen tila
Oodin toisessa kerroksessa sijaitseva Kaupunkiverstaas on kaikille avoin tee-se-itse -kulttuurin tila.



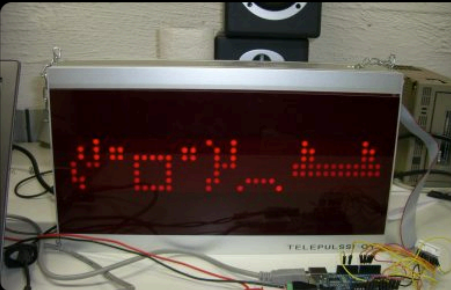
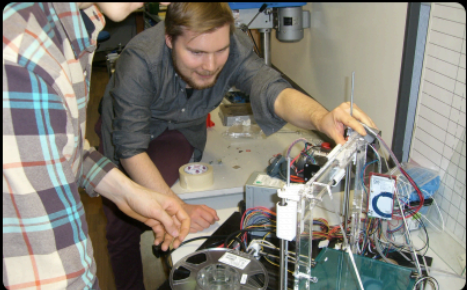
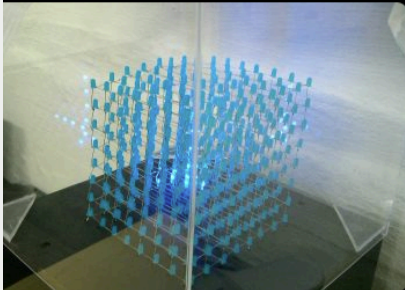
Hacklab Jyväskylä



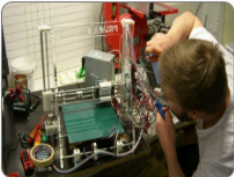
Hacklab Jyväskylä
Makers' living room

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✚ Jos osaat suomea, tule [suomenkielisille sivuillemme](#). Ne ovat tuntuvasti laajemmat!



3D printing

Learn to create almost anything with our 3D printers. Prusa i3 ja GEEETech i3 3D printers are freely available for our members to use and we'll gladly guide on using them.



Workshop

An inclusive collection of tools for working with wood, metal and electronic devices can be found at the lab. A bandsaw and a drill press are available for fast processing of wood and metal.

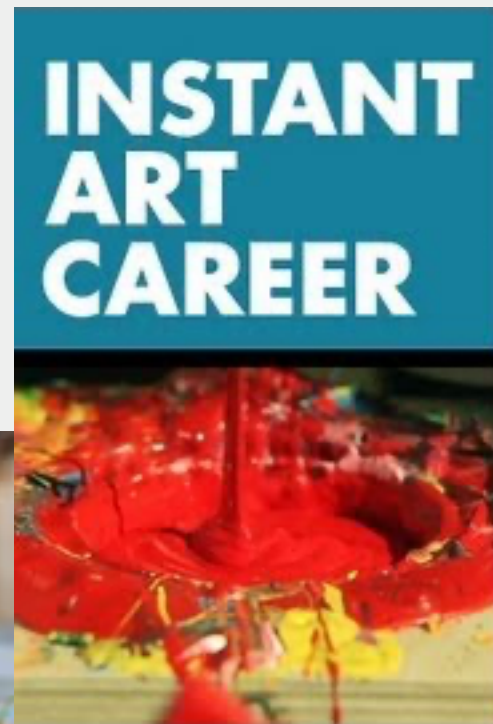


Electronics

Soldering and electronic device fixing can be done at the lab. On our soldering station you can find a soldering iron, a vacuum de-soldering gun and a hot air station. Problems are often easier to solve with a digital oscilloscope that can also be found at the station.



Esimerkki: Kati Hyypä





Esimerkki: Device Orchestra





Esimerkki: Koelse.org





Esimerkki: Sam Aaron / live coding





Klassikko: Wintergatan





To sum up: Drivers of Maker Movement

- The difference: use of materials + mindset
- Technological development, access to materials and information
 - / single-board microcontrollers, 3d-printing, IoT, sensors
 - / relatively cheap, easy to get
 - / availability of information: the Internet
 - / coding!! (new "material")
- Mindset
 - / creativity, "This is just super cool!"
 - / autonomy (emancipation; reveal and challenge power structures), "I have the right to do it!"
 - / curiosity, lifelong learning, "I want to know more!"
 - / intrinsic motivation, play, fun, "I want to do it!"
 - / self-efficacy, competence beliefs, "I can do it!"
 - / sharing, solidarity, social interaction, "Let's do it together!"
 - / self-expression, "Look what I did!"



Naomi Wu

- Chinese DIY maker and internet personality, advocate of women in tech
- Youtube: 50th of Chinese channels
- "I have middle-school level shop/DIY skills, but I live in the most ideal hardware fabrication ecosystem in the world for these kinds of projects. I build everything myself." (Gaudette 2017)
- The first certified Chinese open-source hardware product (Sino:bit)
- Face Changer - Biometric Countermeasures Based on Traditional Chinese Opera

<https://www.youtube.com/watch?v=D-b23eyyUCo>





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tilaailehti.fi



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Näin saat käyttöikeuden Tee Itse -arkistoon. ...
teeitse.com



Mediakortit
mediakortit.fi



Käytännöllinen työtakki nyt lahjaksi ...
ostosvinkit.com



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tarjoukset.info



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tori.fi



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vertaahinta.com



Tee Itse: tarjous, tilaus ...
lehtitarjous24.fi



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tori.fi



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tilaus.teeitse.com



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suomela.fi



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aikakausilehdet.fi



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lehtia.com



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The Potential of Making in Education (Vossoughi & Bevan 2014)

- Supporting new intellectual dispositions, identities and future trajectories
- Connecting to (rather than replacing) familiar practices
- Advancing agency and authorship
- Contextualizing STEM concepts and practices in meaningful activity
- Cultivating inter-disciplinary practice
- Encouraging intellectual risk-taking, experimentation and iteration
- Encouraging collaboration and sharing
- Treating expert/novice roles as fluid



The 'Keychain Syndrome' (Blikstein, 2013)

- New equipment -> easily generate esthetically attractive objects -> admired by external observers -> learner stays at the local minimum of efforts
- "Settling for simple projects is a temptation that educators have to avoid at all cost"

Facilitator: What would you do if you had a laser cutter at home?

Megan: I would make keychains.

Nancy: Yeah, and sell 'em.

Facilitator: Keychains? What kind?

Megan: Like, these (she takes out a collection of keychains that she had recently printed)

Facilitator: Anything else?

Megan: No, just keychains.

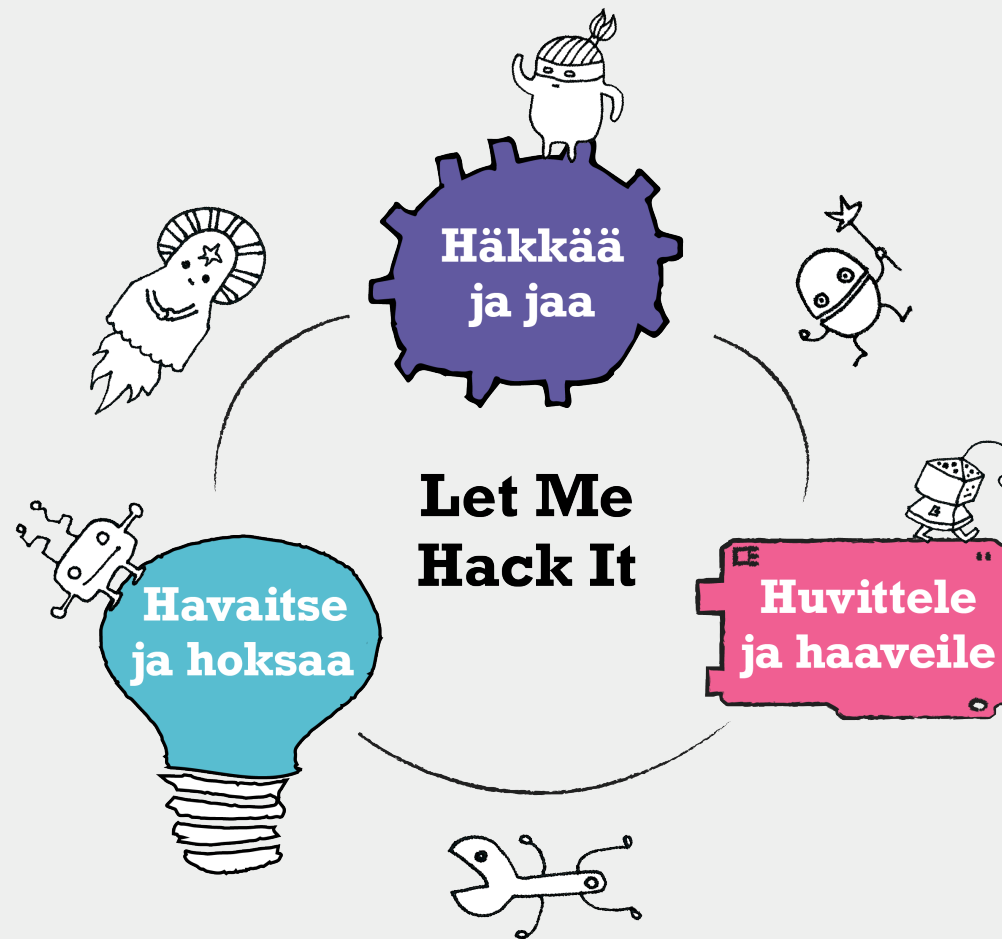


Let Me Hack It -verkkokurssi

- Keväällä ja syksyllä 2019
- 600 opettajaa
- Seitsemän viikkoa
- Lukemista, videoita
- Keskustelua, käytännön koodaamista ja tekemistä
- Luovuutta
- Sovellettavuus omaan käytännön opetustyöhön



Pedagoginen malli





Teknologiat

- Processing
 - / kuvataiteen ja multimedian ohjelmointi
 - / pohjautuu Java-kieleen, hyvä lausekieliseen ohjelmointiin tutustumiseen
- SonicPi
 - / musiikin ohjelmointi livenä
- Arduino
 - / elektroniikka + ohjelmointi



Research results (Heilala et al. In press)

- Reasons to attend the course
 - / Interest in the subject, interesting preconception
 - / Personal development, wanting to learn new, lack of previous knowledge, employability
 - / Work requirement, applicability in practice, interest in applying
 - / Possibility to receive guidance, flexible studying, certificate of completion



Research results

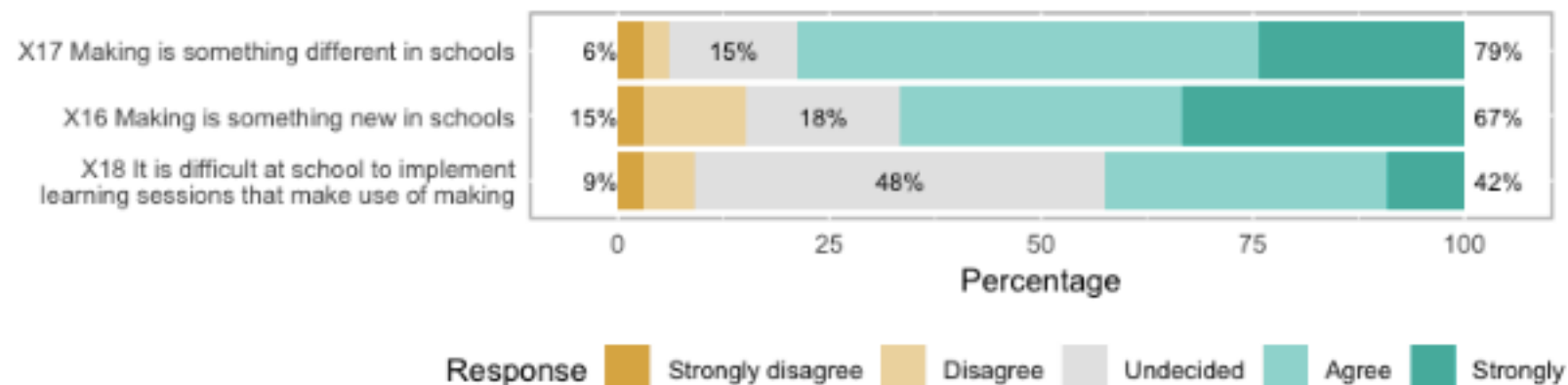


Fig. 7: Items depicting teachers' opinions about the status of making in schools.



Research results

3.4 RQ4: Opinions on advantages and disadvantages of making in teaching and learning

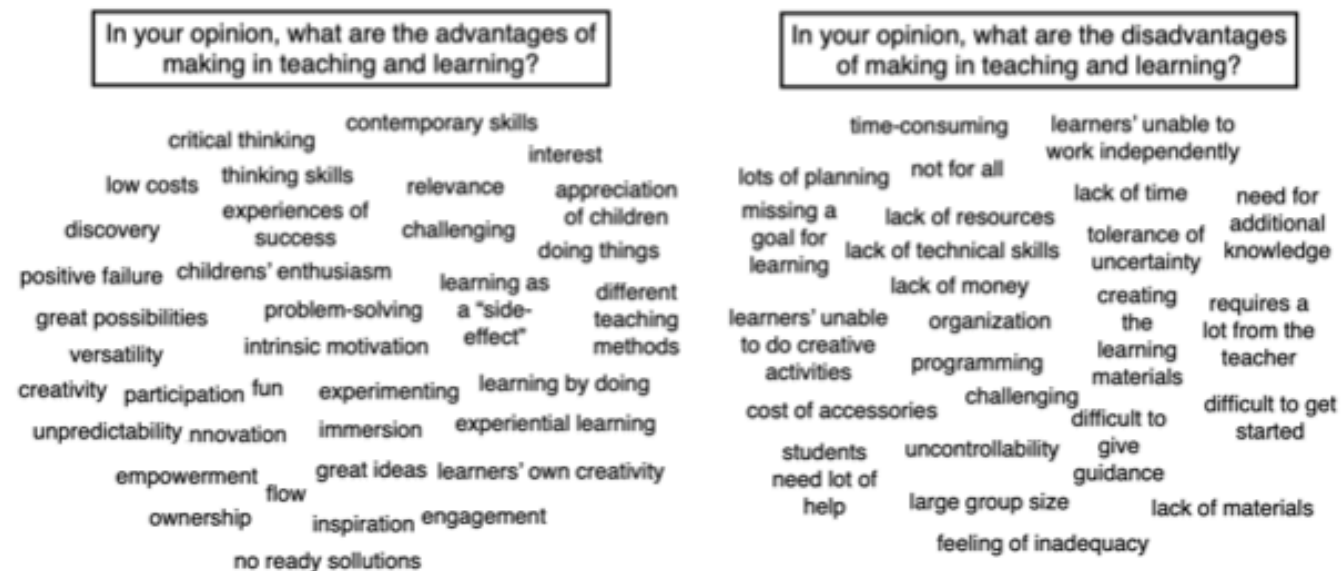


Fig. 8: Keywords extracted from the teachers' open-ended answers concerning advantages and disadvantages of making in teaching and learning.



Lopputeesit

- Teknologia vaikuttaa elämäämme entistä enemmän (hyvässä ja huonossa)
- Lapsilla ja nuorilla on oikeus ymmärtää teknologiaa
- Ymmärtämällä teknologiaa voit tehdä valistuneita päätöksiä (jotta joku muu ei tee sitä sinun puolestasi).
- Omakohtainen teknologiasuhde ja teknologinen toimijuus kehittyvät ”laittamalla kädet teknologiaan” (opettajalla on myös suuri merkitys).
- Koulutuksella voidaan edistää teknologisen samanarvoisuuden toteutumisessa



Lähteet

- Blikstein, P. (2013). Digital Fabrication and 'Making' in Education: The Democratization of Invention. In J. Walter-Herrmann & C. Büching (Eds.), *FabLabs: Of Machines, Makers and Inventors*. Bielefeld: Transcript Publishers.
- Gaudette, E. (2017). Meet Naomi Wu, target of an American tech bro witchhunt. <https://www.newsweek.com/naomi-wu-sexy-cyborg-misogyny-silicon-valley-704372>
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- Vossoughi, S., & Bevan, B. (2014). Making and tinkering: A review of the literature. *National Research Council Committee on Out of School Time STEM*, 1-55.