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Weaving the SDGs – a reflection on quadrangles and embodied practices

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Why weave the SDGs?

The following introduction to the report on an experimental project financed by the Austrian Academy of Sciences and carried out in co-operation with Deutsches Museum, Munich, starts with observations on the current state of implementation of the Sustainable Development Goals worldwide and in Austria. It identifies the images used to communicate the SDGs as one overlooked lever for the transformation the SDGs seek to achieve. Finally, it discusses embodied practices as a way forward. The final section introduces a concrete craft practice, that of tablet weaving to fill the metaphor of „weaving a new tapestry for society" with life.

The current state of SDG implementation

In its interdisciplinary report from 2018, the Commission for Interdisciplinary Ecological Studies of the Austrian Academy of Sciences gave an overview of the UN Agenda 2030, better known as Sustainable Development Goals (SDGs), and their interdependences (Winiwarter 2018). The report also discussed the situation in Austria, calling for more action. Since then, the SDG's international Independent Panel of Scientists, among them Austrian demographer Wolfgang Lutz, published their first report on progress in implementing the SDGs. Its title is „The Future is Now" (Independent Group of Scientists appointed by the Secretary-General 2019). Its executive summary uses remarkably strong wording and leaves no doubt about the lack of implementation and progress (emphasis added):

„However, despite the initial efforts, the world is **not on track** for achieving most of the 169 targets that comprise the Goals. The limited success in progress towards the Goals **raises strong concerns and sounds the alarm for the international community**. Much more needs to happen – and quickly – to bring about the transformative changes that are required: impeding policies should urgently be reversed or modified, and **recent advances that holistically promote the Goals should be scaled up in an accelerated fashion**.

Adding to the concern is the fact that recent trends along several dimensions with cross-cutting impacts across the entire 2030 Agenda are **not even moving in the right direction**. Four in particular fall into that category: **rising inequalities, climate change, biodiversity loss and increasing amounts of waste from human activity** that are overwhelming capacities to process them. Critically, recent analysis suggests that **some of those negative trends presage a move towards the crossing of negative tipping points**, which would lead to dramatic changes in the conditions of the Earth system in ways that are irreversible on time scales meaningful for society. Recent assessments show that, under current trends, the world's social and natural biophysical systems cannot support the aspirations for universal human well-being embedded in the Sustainable Development Goals.

Just over 10 years remain to achieve the 2030 Agenda, **but no country is yet convincingly able to meet a set of basic human needs at a globally sustainable level of resource use**. All are distant to varying degrees from the overarching target of balancing human wellbeing with a healthy environment. Each country must respond to its own conditions and priorities, while breaking away from current practices of growing first and cleaning up later. The universal transformation towards sustainable development in the next decade depends on the simultaneous achievement of country specific innovative pathways."

After this rather dire assessment, the report continues: „Nevertheless, there is reason for hope. Human well-being need not depend on intensive resource use, nor need it exacerbate or entrench inequalities and deprivations. **Scientific knowledge allows for the identification of critical pathways that break that pattern, and there are numerous examples from across the world that show that it is possible.**" (all quotes in Independent Group of Scientists appointed by the Secretary-General 2019, p. XX) Scientific knowledge, the report implies, is the way forward. It identifies pathways for breaking the pattern of intensive resource use, inequalities and deprivation. But what kind of scientific knowledge does that, how are patterns broken and what kind of new patterns should and could emerge? The report suggests four levers as entry points for a transformation. They are governance, economy and finance, individual and collective action and finally, science and technology.

Among the many implementation problems that both the ÖAW and the international report identified are (1) indicators to measure meaningfully, (2) avoiding cherry-picking of goals, targets or periods of reporting and (3) supporting practices that make a difference rather than those that are greenwashing-feel-good pseudo-solutions.

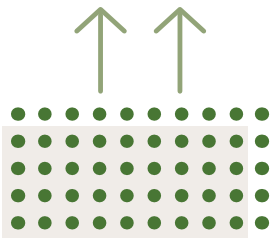
Can we learn from the UN? The SDGs have given rise to a specialised practice within UN organisations, showing each of the goal quadrangles to which a particular initiative contributes. One such image, taken from UNIDO[1] is shown in Figure 1, but hundreds of such images exist.

Figure 1: screenshot from https://www.unido.org/viennas-sdgs-solutiontalks, accessed on Sept. 15, 2020.

1 https://www.unido.org/viennas-sdgs-solutiontalks

The SDGs have also led to specialised reports detailing how little progress has been made, one of the most recent ones by the OECD (OECD 2020). Their executive summary (p. 19) reads: „The transformative nature of the 2030 Agenda provides a key opportunity for national, regional and local governments to promote a new sustainable development paradigm." This uplifting assessment on the potential is followed by a rather devastating report. After five years, that is, one-third of the time to achieve the goals and with only ten years to go, „At least 80 % of regions from OECD countries have not achieved the suggested end values for 2030 in any of the 17 goals. Not a single region in the OECD has achieved the suggested end values for SDG 13 on „Climate Action" and SDG 5 on „Gender Equality." (p. 21). This report, of particular importance due to still growing urbanisation, concludes with a „Checklist for Public Action" to facilitate the uptake and implementation of the SDGs. It is summarised here without identifying each verbatim quote. All text is taken from page 21 of the report. Key recommendations are to use the SDGs to define and shape local and regional development visions, strategies, plans, and re-orient existing ones. Clean forms of urban mobility, affordable housing, gender equality, access to green spaces, balanced urban development, clean water and sanitation, air quality, solid waste management, territorial inequalities, or service delivery should be aimed for. Policy priorities, incentives, and objectives should be aligned across national, regional and local governments. Regions and cities should be engaged in the process of Voluntary National Reviews to reflect progress at subnational level and address regional disparities. The OECD hopes that Voluntary Local Reviews would also drive better multi-level governance. The OECD calls for mainstreaming the SDGs in budgeting processes to ensure adequate resources are allocated for the implementation of the Agenda 2030. Governments should allocate financial resources based on the identified place-based policy priorities and key local challenges, and use the SDGs framework as a means to foster integrated multi-sectoral programmes and priorities. Localised indicator systems should be developed to guide policies and actions for better people's lives. In particular, for more comprehensive assessment and policy responses, cities and regions should combine data and indicators at different scales, from those related to administrative boundaries (the unit for political and administrative action) to those related to functional approaches (the economic geography of where people live and work). Finally, the OECD suggests that the SDGs be used as a vehicle to enhance accountability and transparency through engaging all territorial stakeholders, including civil society, citizens, youth, academia and private companies, in the policy-making process. Cities and regions should use a combination of various tools to engage local stakeholders, such as awareness-raising campaigns, networking opportunities, but also de-risking investments in SDG solutions through grants or loans, as well as fiscal incentive for innovative solutions towards sustainability. How all this „should" can be put into action remains on the level of best practice suggestions in the report. But can one do much better?

Rich countries with good education systems and developed democratic governance structures, with free media and a long history of peace have a far easier road to reaching the SDGs than those under challenging conditions. Austria is a good example for such a country. It could use its privileged position to make progress towards the goals. But the Austrian Progress Report (all national reporting is voluntary!) (Bundeskanzleramt (2020), decided to focus on success stories and remains on a very general level. The assessment of progress towards each goal uses arrows to show if progress is made or not. While the text (emphasis added) allows for some more critical views, the images (a selection can be found in Figure 2) are meant to convince readers that everything is fine: „Greenhouse gas emissions decreased slightly between 2010 and 2014 before increasing by 3.3 % from 2016 to 2017. The main reasons for this included **the sharp increase in sales of transport fuel and the increased use of fossil fuels in industrial and energy companies** (Environment Agency Austria 2019). According to the latest figures, Austria's greenhouse gas emissions amounted to around 79 million tonnes in 2018. This equates to a fall of 3.8 %or 3.1 million tonnes of CO_2 equivalent as compared to 2017. **One reason for that was mild weather**. At 9.4 tonnes of CO_2 equivalent per resident, Austria's greenhouse gas emissions were slightly higher than the EU-28 average of 8.8 tonnes per capita." (p. 91) – Thanks to mild weather, Austrian officials can claim progress where there is little if any. Unfortunately, glossy paper progress reports with relatively little substance are rather the norm than the exception. The case of Austria shows that little progress can be expected if all reporting remains voluntary and unstandardized.



Per capita emissions in Austria were around 8% higher than the EU-28 average in 2017.

Target	National indicators (selected)	Trend
13.1	Deaths attributed to natural disasters per 100,000 population	↑
	Heat-related excess mortality	:
	National crisis and disaster management	✓
	Soldiers deployed for disaster relief operations in Austria	:
13.2	Austrian strategy for adaptation to climate change	✓
	Greenhouse gas emissions	↗
	Non-ETS greenhouse gas emissions (= effort sharing)	↘ TARGET

Figure 2: Two images from Austria's first voluntary national SDG report, from the chapter on SDG 13, Climate Action. (p. 88f). https://sustainabledevelopment.un.org/content/documents/26511VNR_2020_Austria_Report_English.pdf

So how about the scientific community? The Austrian Academy of Sciences held the biggest Austrian congress to date on the SDGs in 2019, highlighting a lot of great research inspired by the SDGs. Some impressions from it can be found in a publication titled „Global Sustainable Development Goals in a Mediatized World". The main theme of the congress was to discuss how the global mediatization of society changes the opportunities and challenges for implementation (Österreichische Akademie der Wissenschaften 2020). Among the cast of plenary speakers were Nebojsa Nakicenovic, who spoke about an international initiative called „The World in 2050 (TWI2050)". [2] This initiative is a good example of SDG-related science activities. According to the project's description, TWI2050 was launched by the International Institute for Applied Systems Analysis (IIASA), the Sustainable Development Solutions Network (SDSN), and the Stockholm Resilience Centre (SRC) as a global research initiative in support of a successful implementation of the United Nations' 2030 Agenda. The goal of TWI2050 is to provide the fact-based knowledge to support the policy process and implementation of the SDGs. The group identifies Six Grand Transformations towards the Sustainable Development Goals, depicted in Figure 3 in an updated version including the COVID-19 response. According to the authors of a recent publication, the transformations are conceptualized as „modular building-blocks" of SDG achievement: (1) education, gender and inequality; (2) health, well-being and demography; (3) energy decarbonization and sustainable industry; (4) sustainable food, land, water and oceans; (5) sustainable cities and communities; and (6) digital revolution for sustainable development (Sachs et al. 2019). As is immediately visible, the focus here is on innovation. Innovation, the driving force for the past 200 years of European history and later, world history, is one area on which many stakeholders can agree, as it is the most commonly agreed-upon (or least controversial) driver of success.

Demographer Wolfgang Lutz presented his revolutionary indicator „YoGL" at another plenary talk at the congress. He suggests switching from a global fixation on economic growth by measuring GDP (Gross Domestic Product) to an indicator for assessing sustainable human wellbeing, „Years of Good Life" (Lutz et al. 2018). As can be seen in Figure 4, the „Years of Good Life" are calculated by determining years of life above a minimum threshold both in terms of objective well-being dimensions as well as subjective life satisfaction. Maximising YoGL in a population sustainably, that is, without moving a population away from the SDGs, would, so the argument, be the most sensible way forward. Three indicators are used to determine the capable years of life: (1) Being out of absolute poverty (2) being able to read and comprehend a sentence, as assessed through a standardised

2 https://iiasa.ac.at/web/home/research/twi/TWI2050.html

Figure 3: The Six Transformations envisaged by TWI 2050, taken from http://pure.iiasa.ac.at/id/eprint/16533/1/TWI2050-web-2.pdf (p. 13), accessed on April 12, 2021.

test of basic literacy and finally, (3) having no severe activity limitation. A „single item life satisfaction scale" was used to assess the subjective years with positive satisfaction, which are depicted as yellow circle. According to Lutz et al. (2018), YoGL as new summary indicator can be the basis of a sustainability transformation. The big red circle shows the overall years of life which summarise the expected length of life of a person based on the currently observed mortality/survival rates in the chosen population. The Years of Good Life are a subset of these overall years of life that result from the overlapping area (green area) of the capable years of life (blue circle, defined by three measurable criteria) and years with subjective life satisfaction above a minimal level (yellow area).

These glimpses of the ongoing discussion should not be mistaken as an overview. But, taken together with the above-mentioned report from 2018, they show that the SDGs' announcement in 2015 has initiated a flurry of activities, among them some very interesting scientific attempts and a lot of reporting, unfortunately sometimes on the border of cherry-picked greenwashing. Assessments have shown that the implementation gap has not narrowed over the past five years. As briefly discussed in the preface to this

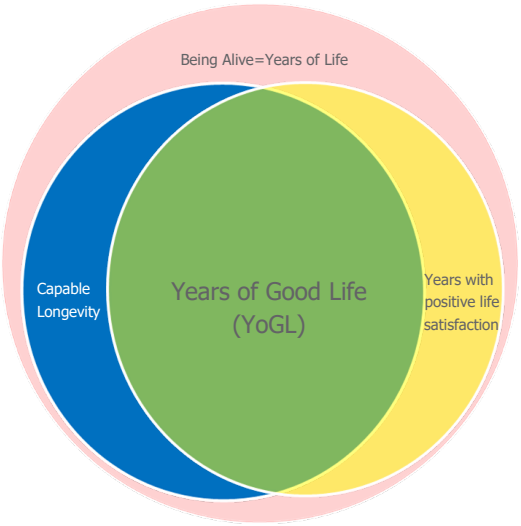


Figure 4: Years of Good Life (YoGL) as a new summary indicator for sustainability transformation. Taken from http://pure.iiasa.ac.at/id/eprint/15402/1/WP-18-007.pdf (p. 8), accessed on Sept. 15, 2020.

volume, after many conversations and after teaching several university-level courses on the SDGs, I had started wondering which role the official graphical representation of the SDGs might play in the apparent failure to TRANSFORM society at large. Any user of websites dedicated to SDG implementation will have seen forbidden versions of either the „colour wheel" or the icons of the SDGs, despite a 68-page guideline on proper use. Figure 5 shows two instances of forbidden uses (UN Department of Global Communications 2018).

The Colour Wheel must not have anything but colours, so reducing the goals to a palette without apparent content, and, while apparently parts of a wheel, lacking connection and a centre. The icons, as shown in Figure 6 from the guidelines, are particularly problematic as they are an orthogonalised set of quadrangles. They are, as Ellen Harlizius-Klück kindly observed, overdetermined by carrying a color, a number, a text and an icon each[3].

While the guidelines sound very definitive, there is even an UN page on resources for SDG outreach activities that are apparently okay, although would not be allowed according to the guidelines. [4]

Stacks of cubes with the SDGs on were used at several events in Austria. A variety of 3-D-items to promote the SDGs such as cubes are available.[5] It is rather sobering to see the amount of merchandise produced and sold in promoting the SDGs. These items are not indicating a transformation; rather, their production signals a „more of the same" approach (see Figure 8 for an example).

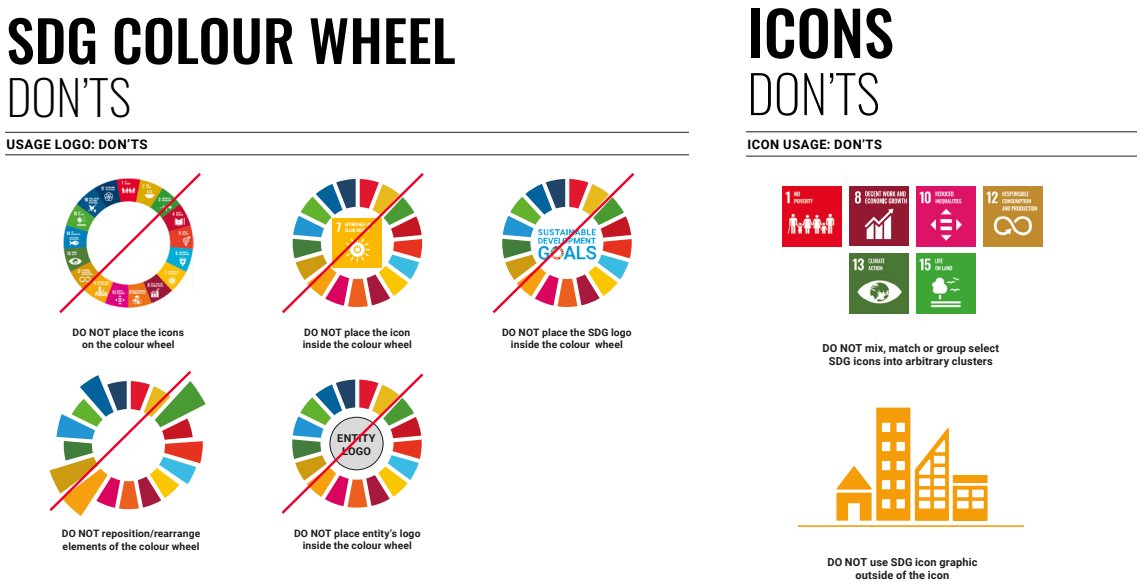


Figure 5: Examples of uses of the SDG Colour Wheel and Icons that are officially forbidden. Compare Figure 1 for an apparently forbidden use from within the UN, accessed on Sept. 15, 2020. (UN Department of Global Communications 2018).

3 Personal communication with the author, 2019.

4 https://www.globalgoals.org/resources

5 https://sdgactionshop.org/products/sdg-cubes

17 ICONS: COLOUR VERSION

When an icon is on a square, that square must be proportional 1 x 1.

The white icon should be contained by its defined colour, or black background.

Do not alter the colours of the SDG icons.

Figure 6: The official guideline image on the SDG Icons, accessed on Sept. 15, 2020.

Figure 7: SDG cubes as available for purchase on the internet. (https://sdgactionshop.org/products/sdg-cubes)

Progress towards the SDGs by overcoming hierarchies of knowledge

The SDGs call for a transformation. In a profound sense, this rests on new ways of manipulating materials, based on fundamental changes in the „programmes" for manipulation. The SDGs are a set of „phenomena" (in the broadest sense of the word), which, using Michel Foucault's insights, form a „dispositive". He explained the notion as „ […] a thoroughly heterogenous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions–in short, the said as much as the unsaid. Such are the elements of the dispositive" (Foucault 1980). The secretariate of the SDGs, their website, its layout and its texts can be understood as part of the SDG dispositive. Why is it important to analyse the SDG as a dispositive? How the vast „SDG"-network of discourses and materialities is conceptualized has an important bearing on their implementation because power relations are shaped within this heterogeneous formation – despite the call for equality and participation inherent in the SDGs.

Knowledge has recently been conceptualized as a form of communicative action, with circulation as a constitutive feature (Secord 2004, 661), this ties in well with its role in a dispositive (Secord 2004). How knowledge is defined and which knowledge is (openly or tacitly) privileged is crucial. At a time when the status of knowledge is increasingly being contested, framing something as knowledge (or as information, as hyphenated or otherwise qualified particularity within knowledge, such as „embodied knowledge" or know-how) influences which status within the dispositive it will have. As stated on their website, „The Division for Sustainable Development Goals (DSDG) in the United Nations Department of Economic and Social Affairs (UNDESA) acts as the Secretariat for the SDGs, providing substantive support and capacity-building for the goals and their related thematic issues, […]" and further: „The Division serves Member States, Major Groups and other stakeholders, as well as the general public, by providing wide access to information and knowledge for sustainable development, through its online Sustainable Development Knowledge Platform and social media outlets." [6]

Figure 8: SDG merchandise (https://www.starlapelpin.com/wp-content/uploads/2019/09/SDGs-products.jpg).

The secretariat and its website act as gatekeeper and amplifier and therefore defines what is considered „Sustainable Development Knowledge". Within the practice of the SDGs, „scientific", seemingly unsituated, „pure" knowledge as produced by the specialized social sub-system of scholars, academia is knowledge as such. All other knowledge needs qualifiers, such as „traditional ecological" knowledge, „tacit" knowledge, sometimes even „expert" knowledge. Crafts such as weaving are (dis-)qualified by calling them „embodied", „tacit" even if this were a good description of the form of knowledge they produce.

The dispositive at work now claims to build capacity. But the sustainability transformation needs more than that, it needs third order change, as exemplified in Table 1. „First order change, which seeks effective-

6 https://www.un.org/development/desa/en/about/desa-divisions/sustainable-development.html

ness or efficiency, is conformative and can be summarized as 'Doing things better'. Second order learning seeks examining and changing assumptions, It is reformative and can be described as 'Doing better things'. The third type of learning, epistemic learning, leads to a paradigm shift and is transformative. It can be summarized as 'Seeing things differently'." The third type has been identified as the type of scholarship reflexive modernity needs[7].

Table 1: Orders of learning, their goals and short descriptions (Source: Sterling, 2011: 25).

Orders of change/learning		Seeds/leads to:	Can be labelled as:
First order change/cognition	↓	Effectiveness/efficiency	"Doin things better" Confirmative
Second order change/meta-cognition		examining and changing assumptions	"Doing better things" Reformative
Third order change/epistemic learning		Paradigm change	"Seeing things differently" Transformative

But even if there is agreement on this need in the sustainability sciences, the process to „change mental models" underlying the transformation to third order learning remains vague. Dialogic processes are a common suggestion (Palma & Pedrozo 2016).

Learning outcome taxonomies are of little help, because they are not transformation-oriented. After careful consideration, and a survey of even the most creative, striking violations of the SDG logo requirements (see Figure 9), it can be surmised that an Episteme of Sustainability might rather be achieved by engaging in embodied learning journeys by weaving the SDGs.

As detailed above, there is a great implementation gap in the SDG project. How can the embodied processes of craft contribute to the sustainability transformation? As Nithikul Nimkulrat, a textile artist, designer, researcher and educator originally from Bangkok, Thailand, argued, „In textiles as well as other material-designated disciplines, craft is understood not only as a way of making things by hand, but also as a way of thinking through the hand manipulating a material" (Nimkulrat, 2010, p. 64 in Nimkulrat 2012). Craft is thus „a means for logically thinking through senses" (Nimkulrat, 2010, p. 75 in Nimkulrat 2012). This understanding follows the notion of craft as „a way of thinking through practices of all kinds" (Adamson, 2007, p. 7 in Nimkulrat 2012) and „a dynamic process of learning and understanding through material experience" (Gray and Burnett, 2009, p. 51 in Nimkulrat 2012).

When asking if craft as a way of thinking through practices would foster the SDG implementation, weaving seemed a particularly apt plausible choice due to its morphological similarity to the networked character of the SDGs. Weaving entangles warp and weft, and their joints form the weave. The system is simple and yet allows for a myriad of patterns. Ellen Harlizius-Klück's work on the episteme of weaving as a foundation for the ability to think in an abstract way has inspired the project (Harlizius-Klück 2004). New forms of implementing the SDGs can profit from experiencing the complexity of controlling the pattern and the fabric's materiality simultaneously.

Learning outcome taxonomies are of little help, because they are not transformation-oriented. After careful consideration, including a survey of the most creative, striking depictions of the SDGs as process (in violation of the logo requirements, see Figure 9), a working hypothesis could be that the transformation, so far represented by unrelated cubes, might profit from a different representation. Such a representation should not lead to new forms of merchandise, but to new forms of learning journeys. Charlotte Holzer was willing to pioneer this learning journey, to document it and to share the products of her learning journey with us.

7 This paragraph is a quotation from Verena Winiwarter, Perspectives on Social Ecology: Learning for a Sustainable Future. In: H. Haberl, F. Krausmann, M. Fischer-Kowalski, V. Winiwarter (Ed.) Social Ecology. Society-Nature Relations across Time and Space. Springer, Cham, 2016, 577–589.

Figure 9: The central part of a poster by Visipedia, offering a powerful visual metaphor for the SDGs. https://www.visipedia.at/wp-content/uploads/2018/07/VISI_SDG_web_s.jpg

Tablet weaving the SDGs

With as little material requirement as possible, without costly looms and technical implements that will not be available on a global level, tablet weaving was chosen for its global potential. Tablets can be made from many materials, including scrap cardboard or discarded plastic sheet material. Tablet weavers need a tree or another solid base to tie the end of their weave to, and a belt or cord around their waist for the other end. These requirements leave almost no-one behind, an important aspect of the SDGs.

The second reason is that, perhaps surprisingly, tablet weaving is one of the most complex weaving techniques, as it creates three-dimensional weaves (Griffiths 2018). It has been used for very intricate patterns in the past, and allows for a great deal of freedom in experimentation.[8, 9]

In the context of the SDGs, the possibility of combining threads on tablets, of moving each tablet independently of others and not least, the ability to experiment with different techniques along one band – as a metaphor of time passing – all speak for the ability of tablet weaving to allow a change of the mental models, for 3rd order learning (see Table 1, above). The interaction with the materials, the respect needed for their possibilities and limits, the moving of hands and the designing of patterns in combination with the experience of bringing a designed pattern to bear on the band allow for third-order learning about the connectedness and the intricacies of the SDGs.

8 For a glimpse into the community, see https://www.tabletweavers.org/.

9 See an older bibliography here: http://weavershand.com/twbiblio.html, Ræder Knudsen, Lise (2009) and for a global overview, Ræder Knudsen, Lise (2014).

References

Bundeskanzleramt "Österreich und die Agenda 2030. Freiwilliger Nationaler Bericht zur Umsetzung der Nachhaltigen Entwicklungsziele/ SDGs (FNU)", 2020. Wien: Bundeskanzleramt, https://sustainabledevelopment.un.org/content/documents/26661VNR_2020_Austria_Report_German.pdf, Vienna: Austrian Federal Chancellery, https://sustainabledevelopment.un.org/content/documents/26512VNR_2020_Austria_Report_English.pdf

Foucault, Michael „The Confession of the Flesh" (1977) interview. In C. Gordon *Power/Knowledge Selected Interviews and Other Writings*. New York: Pantheon Books, 194–228, 1980.

Griffiths, Dave "Further attempts at untangling tablet weave", 2018. https://penelope.hypotheses.org/674; accessed on March 16, 2021.

Harlizius-Klück, Ellen "*Weberei als episteme und die Genese der deduktiven Mathematik. In vier Umschweifen entwickelt aus Platons Dialog Politikos.*" Disseration Oldenburg Universität, 2004.

Independent Group of Scientists appointed by the Secretary-General "*Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*." New York: United Nations, 2019. https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf

Lutz et al. "Years of Good Life (YoGL): A new indicator for assessing sustainable progress." Laxenburg: IIASA, 2018. http://pure.iiasa.ac.at/id/eprint/15402/1/WP-18-007.pdf

Nimkulrat, Nithikul "Hands-on intellect: Integrating craft practice into design research." *International Journal of Design* 6(3), 1–14, 2012.

OECD "A Territorial Approach to the Sustainable Development Goals Synthesis report", 2020. https://www.oecd.org/regional/a-territorial-approach-to-the-sustainable-development-goals-e86fa715-en.htm

Österreichische Akademie der Wissenschaften (Hg.) "Global Sustainable Development Goals in a Mediatized World." *Akademie im Dialog* 18, 2020. https://www.oeaw.ac.at/fileadmin/NEWS/2020/PDF/Webversion_AiD_18.pdf

Palma, Lisiane C. and Pedrozo, Eugênio Á. "Transformative learning to promote sustainability: inserting the third level of learning in management programs." *Brazilian Journal of Science and Technology* 3, 9, 2016.

Ræder Knudsen, Lise "Rekonstruktion des Webvorganges bei der Dürrnberg-Borte." In K. Grömer und T. Stöllner (Hg.) Ein abgerissener Ärmel aus dem Salzbergwerk Dürrnberg. Neue Erkenntnisse zur Brettchenwebtechnik in der Eisenzeit in Mitteleuropa. *Jahrbuch des Römisch-Germanischen Zentralmuseums* 56, 119–121, 2009.

Ræder Knudsen, Lise "*Global Textile Encounters. Ancient Running Animals: Tablet-Woven borders from China and Norway*". Oxford & Philadelphia: Oxbow Books, 37–48, 2014.

Sachs, Jeffrey D., Schmidt-Traub, Guido, Mazzucato, Mariana, Messner, Dirk, Nakicenovic, Nebojsa, and Rockström, Johan "Six Transformations to Achieve the SDGs." *Nature Sustainability* 2, 805–814, 2019. https://www.nature.com/articles/s41893-019-0352-9

Secord, James A. "Knowledge in Transit." *Isis* 95 (4), 654–672, 2004.

Sterling, Stephen "Transformative learning and sustainability: sketching the conceptual ground." *Learn Teach High Educ* 5, 17–32, 2011.

TWI2050 – The World in 2050 "Innovations for Sustainability. Pathways to an efficient and post-pandemic future. Report prepared by The World in 2050 initiative. International Institute for Applied Systems Analysis (IIASA)." Laxenburg: IIASA, 2020.

UN Department of Global Communications "Sustainable Development Goals. Guidelines for the use of the SDG Logo including the Colour Wheel, and 17 Icons", 2018. https://www.un.org/sustainabledevelopment/wp-content/uploads/2019/01/SDG_Guidelines_January_2019.pdf

Winiwarter, Verena "Perspectives on Social Ecology: Learning for a Sustainable Future." In H. Haberl, F. Krausmann, M. Fischer-Kowalski and V. Winiwarter (ed.) *Social Ecology. Society-Nature Relations across Time and Space*. Cham: Springer, 577–589, 2016.

Winiwarter, Verena (Hg.) "Umwelt und Gesellschaft – Herausforderung für Wissenschaft und Politik." *KIOES Opinions 8*, 2018. Vienna: Austrian Academy of Sciences. https://www.oeaw.ac.at/fileadmin/kommissionen/kioes/pdf/Publications/Opinions/KIOES_Opinions_8.pdf

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