



Experience STEAM from Finland: Synergies in Action!



JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ



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- STEAM (Science, Technology, Engineering, Arts and Mathematics), Trans- and Multidisciplinary Learning
- Contemporary Cultural Studies

Co-funded by the
Erasmus+ Programme
of the European Union



Innovative Learning Environments

Finnish Institute
For Educational
Research



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ILE is a research and education group that focuses on the advancement of children's and young people's 21st Century Skills. The field includes especially user-driven design and study of learning technologies and spaces for enhancement of learning and wellbeing, analyses of innovative teaching and learning practices, technology-enhanced learning, and evaluation and comparison of ICT use in education. When applicable, the research can also be directed to other phases of human life for the study of citizen's knowledge society capabilities.

Team members



Marja Kankaanrant Kati Clements Kristof Fenyvesi Tiina Mäkelä Piet Sikström

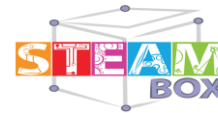


Saana Mehtälä Mikko Muilu Mimmu Alanko Matias Mäki-Kuutti Takumi Yada

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A FRAMEWORK FOR EFFICIENT
AND ENGAGING HYBRID EDUCATION
IN LOWER-SECONDARY SCHOOLS



"Co-designing learning environments
with teachers and learners"



"Assessment of transversal skills in formal and informal learning environments"



Digiloping Teachers:
Digital competences
development and mentoring
for teachers



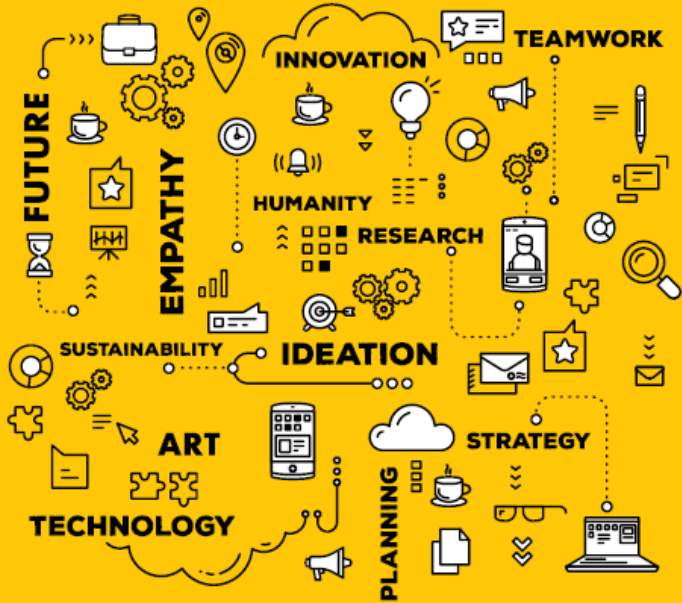
www.experienceworkshop.org/ / Sitat_HBW2016



STEAM:
integration between subjects of
Science, Technology, Engineering,
Arts and Mathematics

LEONARD SOMMER

HOW TO FOSTER CREATIVITY IN 21ST CENTURY EDUCATION



CLASSROOM THINKTANK

18. The Experience Workshop STEAM Network

Kristóf Fenyesi

Kristóf Fenyesi, Ph.D. is a researcher of the Integrated Education of Science, Technology, Engineering, Arts and Mathematics (STEAM). He works in the Finnish Institute for Educational Research in the University of Jyväskylä. He started Experience Workshop STEAM Network (www.experienceworkshop.org), a global community of teachers, scholars, artists, students and parents in 2008.

The COVID-19 crisis made learners of us all. In the ensuing era of social distancing, we have had to be more creative and innovative than ever. One huge task is to provide social and emotional support to all children and teachers who have felt left on the sidelines amid the pandemic. According to UNESCO's statistics, more than 1.6 billion children and youths were affected by school closures at the peak of the COVID-19 crisis in May 2020. This means more than 80% of the total enrolled learners in almost 160 countries.

We need multiple, diverse creativities to rebuild the lost trust, to fix the broken responsibility, and to reinvent social and emotional bonds. We need to learn, both individually and collectively, how to embrace uncertainty. Humanity has to show, perhaps as never before, that original ideas can spread faster, and can mutate and grow stronger than any virus. We have to add up each other's creativities and innovations to ensure bright, new futures through learning for all.

The World During Coronavirus by Saho Nelani, South African student. The Courtesy of Nelson Mandela University's Govan Mbeki Mathematics Development Centre

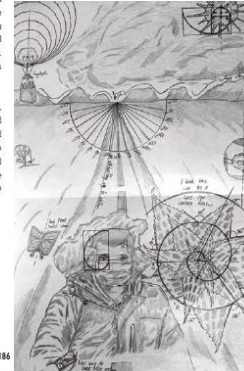
The COVID-19 crisis caused several disruptions in education worldwide. The fragility of educational policies, frameworks, and daily practices has been experienced on various levels. Society is facing dramatic consequences. When we analyse the weaknesses and failures of current practices, and the consequences of our loss, we must recognize several examples for collective creativities emerging simultaneously in the context of 'creative ecologies' – as creativity researchers, Pamela Burnard and Dan Harris suggest in their studies. A higher level of trust, based on the 'creative ecology' in educational systems, institutions, situations, and community-oriented

educational leadership proved to be essential to reorganize everyday learning, even in the deepest points of the crisis. STEAM approaches in education and hybrid learning proved to be a vital combination, helping us reorganize the immunity of educational practices worldwide.

This essay introduces a few practices from the Experience Workshop STEAM Network. These practices unlocked creative pedagogical resources and demonstrated the STEAM (Science, Technology, Engineering, Arts, Mathematics) integrations' wide potential in developing multiplied creativity, not least during critical times.

Experience Workshop was launched as the collaborative effort of mathematicians, artists, teachers, parents, and children in 2008. The organization's main focus is the research and practice of STEAM education: inquiry-based, co-operative, playful, and experience-oriented mathematics education through creative activities; connecting hands-on activities with digital modeling; combining science and art; implementing phenomenon-based and multidisciplinary learning. We develop resources for teachers, parents and students: books, methodological resources, scientific articles, a lot of which is available open access.

I am because we are' by Erin Powers, South African student. The Courtesy of Nelson Mandela University's Govan Mbeki Mathematics Development Centre



Proportionally (D&A) by Jemma Farris, South African student. The Courtesy of Nelson Mandela University's Govan Mbeki Mathematics Development Centre

Check out our open access handbook about creative education. Everyday Creativity: Boosting Creative Resources with Finnish Models of Education. Teachers' Handbook. Eds. Taneli Pieter Soikk, Kristóf Fenyesi, Gönnyöly Soudanlinna, Teo Kangermer. University of Jyväskylä, 2019.



Download the eBook now

The goals of the Math-Art Children and Youth exhibits are supporting both the participants and the audience to actively explore new sources of mathematics and art education through transdisciplinary artworks, created by children and youths to explore various connections between mathematics and art.

– matching and engaging children and teachers in transdisciplinary mathematics and art learning activities as part of educational Math-Art events.

Recently in South Africa, Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GM-MDC) successfully launched a national educational development program based on this concept (see <http://www.math-art.co.za>).

The handbook did not stop the program. Teachers and students found various ways to continue creating and collecting the artworks.

Illustration's Progression of Evolution by Sandra Viljoen, Grade 10. The Courtesy of Nelson Mandela University's Govan Mbeki Mathematics Development Centre

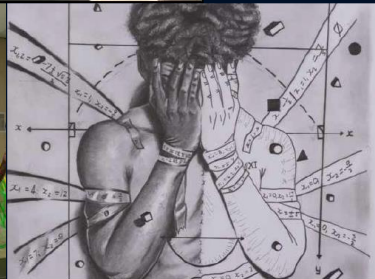


Experience Workshop's Bookend, Come by Nelson Mandela University, South Africa in 2019. Photo by Nazim Wood

Over the years, we have organized countless math-art education events, exhibitions, workshops, seminars, and training programs all over Europe and Africa, America, Asia, and Australia.

The Children and Youth Mathematical Art Exhibits were initiated in 2012 by Kristóf Fenyesi (University of Jyväskylä – Experience Workshop) and John A. High (1942-2017), New York-based painter and educator, founder of the late Children's Art Gallery. Based on the concept, several children- and youth-based Math-Art exhibits have been organized worldwide with the help of Experience Workshop members. The resulting Math Art works have been collected and shown at international exhibitions.

The shown artworks are only a small selection of the experiences, burning through math-art based, not



The Stressed Victorian Man by MandiGabe Kines, grade 11. The Courtesy of Nelson Mandela University's Govan Mbeki Mathematics Development Centre

Artist Statement: "This artwork implies how Mathematics is involved in our daily lives. It gives the impression of how much Maths is and how effective Maths is. Upon drawing to show this specific image, I realize that Mathematics could have a positive or negative impact. Among a few examples of how we experience Maths daily are measurements of our clothing, which is why in my artwork you will see the right side has measurements that are in centimeters, which are used to measure clothes. Clothes require accurate calculations together with the fact that our bodies are asymmetrical, which is why you see that the left side does not look like the right side. We need our measurements to make sure we get the right fittings. My artwork illustrates the simplicity in how the effect of Maths has been ignored and neglected. My illustration also shows the reality of Mathematics, that even though it is interesting and effective, Mathematics could grow to be stressful, especially for teenagers who

have other interests. The artwork shows the main figure who is stressed. I've indicated that his head is slightly bowed to reflect the negative impact. This has brought about the reality which I didn't intend to take. The answers to the equations represent that there are always a solution. This is a form of encouragement to success. I placed the equations on different places to show that there are different ways to get the answer. On the same note, I've shown that if done frequently, Maths could cause a negative influence every part of the brain. The two sides have different shading as indicators to the positive (lighter art, no shading) and negative (darker) side with shading influence of the subject on a person.

I call it 'The Stressed Victorian Man'; a world of modern versions of Dr. Frank's artwork. I admire the artist's art and feel we might have the same kinds on art. The lines on the background are from the Victorian Man with its arms open and legs spread out."

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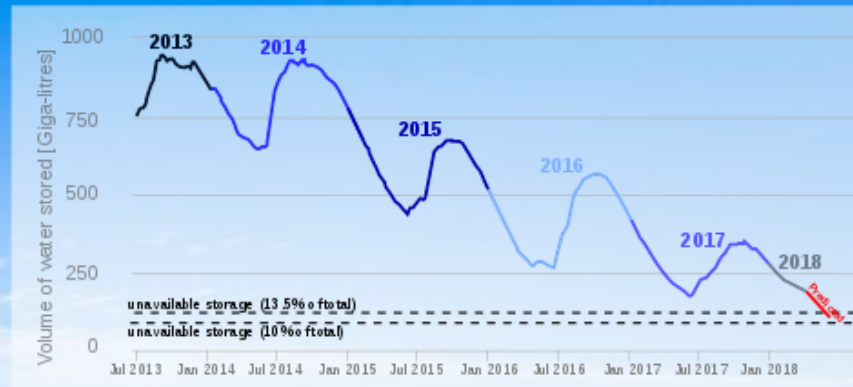
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Cape Town, South Africa

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Cape Town, South Africa

<https://youtu.be/THJVuinPbc0>

<https://youtu.be/kdSUivEdlNO>

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Cape Town's largest water reservoir, Theewaterskloof,
was at 11% capacity in March 2018

LEARNING FROM NATURE – Biomimetics

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안개 수확



Exp. 23 | 17-09-2014 | Melamine Resin Laminate

Time-lapse footage of water condensation combined with data gathered by Warkino

01:06

이름 빛음



Warkino - weather monitoring and material surfaces temperature survey



ARTURO VITTORI

Founder – Bomarzo – Italy

Italian Artist, Architect, and Industrial

Designer. He is the co-founder and Director

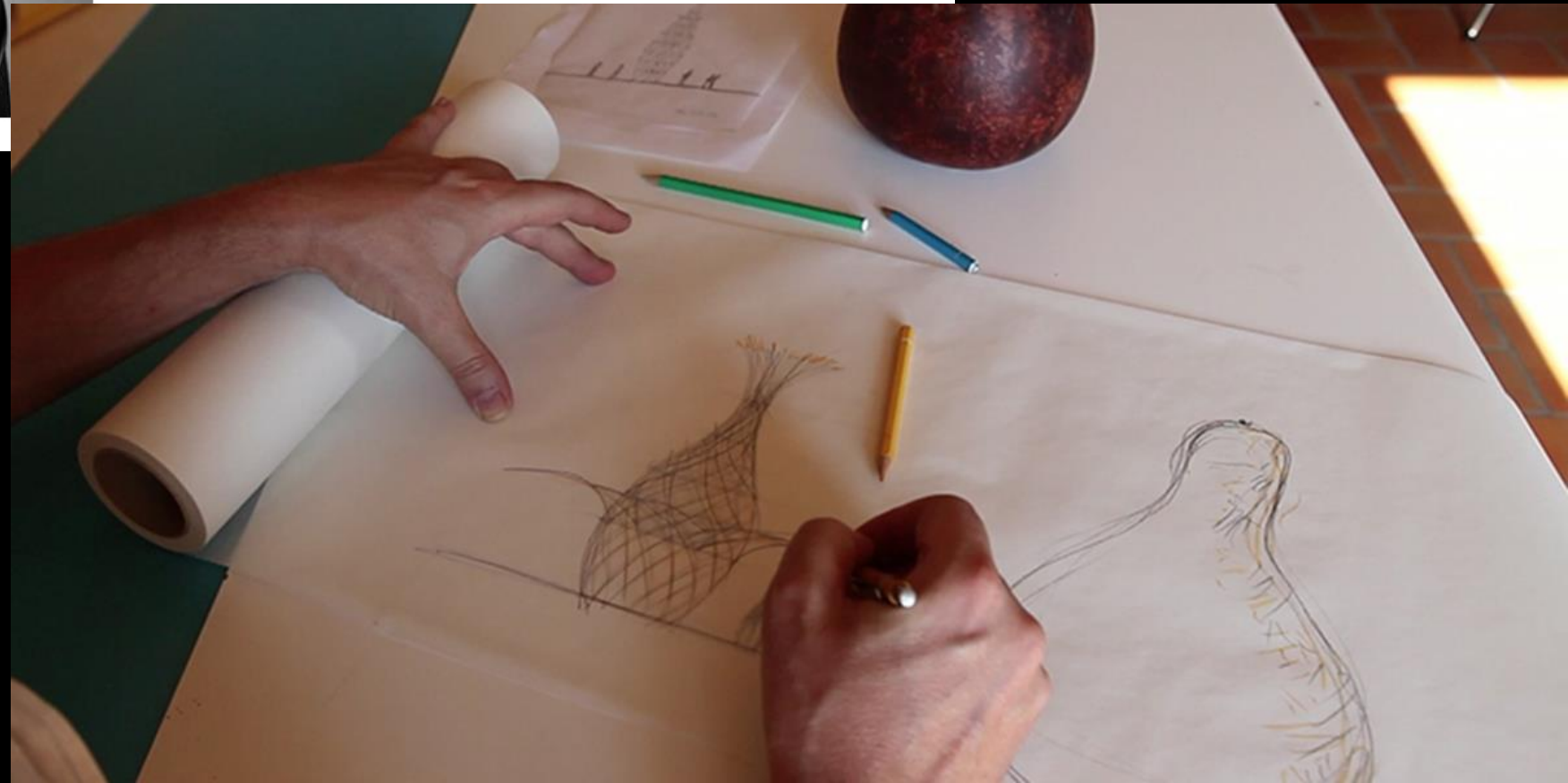
of the design studio **Architecture and Vision**.

WARKA WATER TOWER for HARVESTING WATER FROM THE AIR

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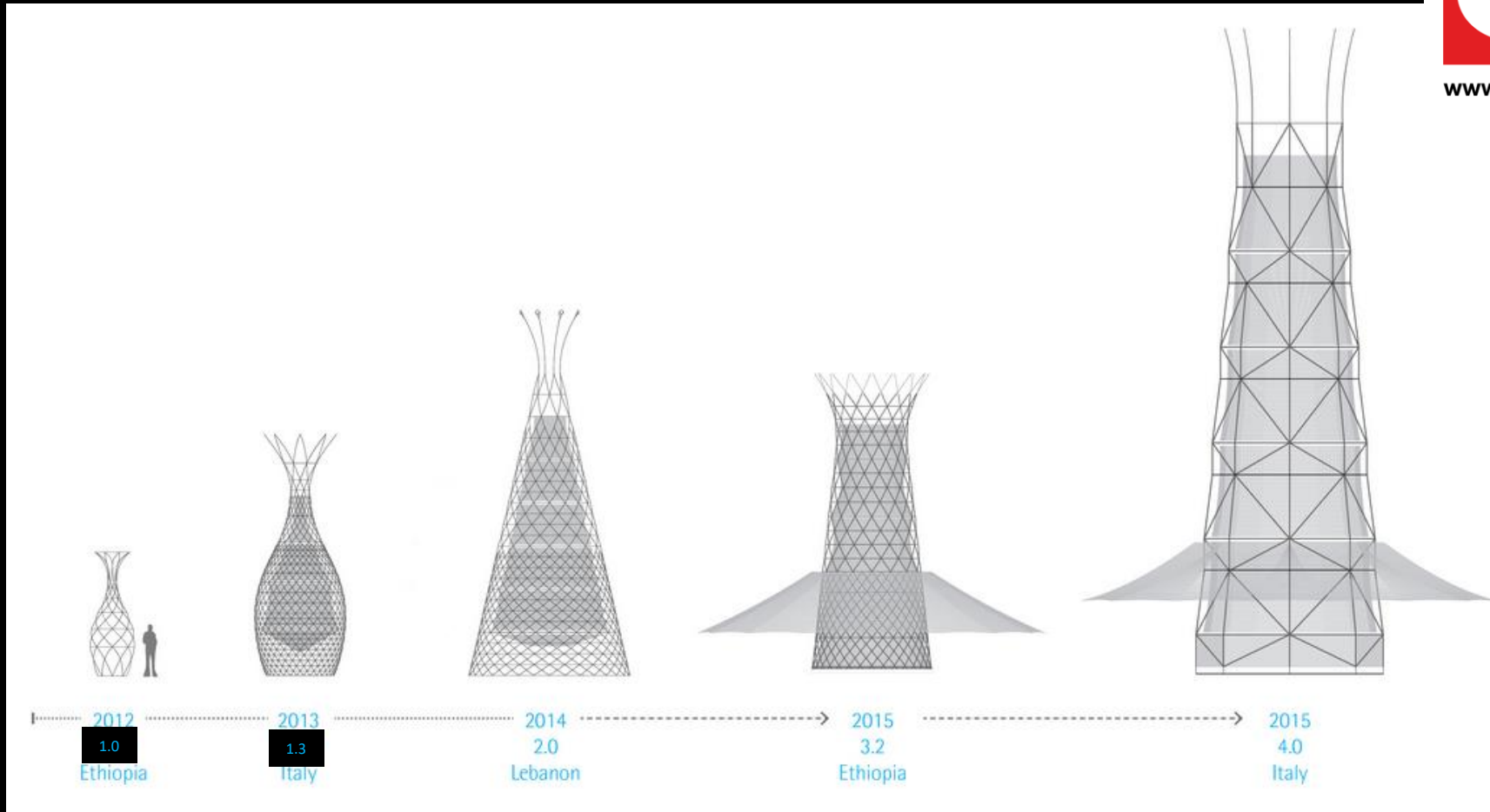


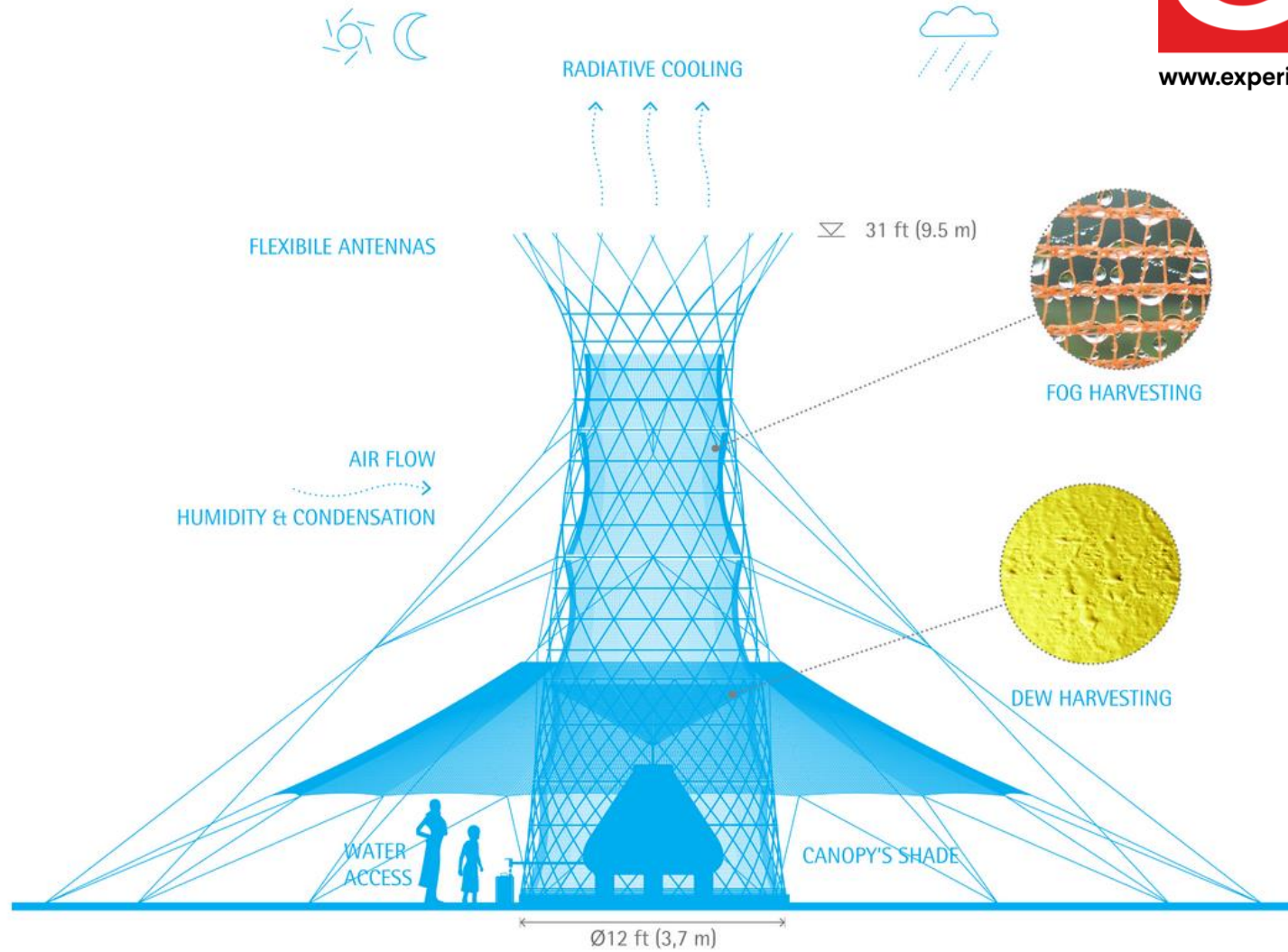
(Evolution)

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Warka Water 1 – Version 1.1



ARCHITECTURE AND VISION

Warka Water 3 – Version 3.2

Hogul Park



- Inventor of 4Dframe
- 4Dframe Creativity Educational Program developer
- Architecture Model Expert with 30 years of experience
- Ph.D. Candidate in Science-gifted education, Korea National University of Education
- Associated degree in Architecture, Dong Seoul University
- Director of 4D Mathematical Science & Creativity Research Institute





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The screenshot shows a 3D software interface with a wireframe model of a vase on the left and a list of construction steps on the right. The software window title is "marks makerD 990". The interface includes a toolbar with various tools and a coordinate system at the bottom.

번	이름	설명	값	형식
1	텍스트1	"by 4frame si"		
2	점 D ₁	x축 위임	D ₁ = 0.21.73	
3	점 E ₁	y축 2축의 교점	E ₁ = 0.0	
4	직선 L ₁	z축에 평행하고, K	L ₁ x = 0.21.73	
5	점 A	L ₁ 위의 점	A = (-21.0, 0.0, 0.0)	
6	점 B	L ₁ 위의 점	B = (-21.0, 0.0, 0.0)	
7	벡터 v	벡터(D ₁ - E ₁)	v = (21.7, 0.0, 0.0)	
8	점 B ₁	v에 의해 A에서 평행 이동	B ₁ = 0.16.790	
9	점 K	v에 의해 A에서 평행 이동	K = (0.0, 0.0, 5.02)	
10	곡면 s		s = 5.02	
11	구 b ₁	반지름이 s이고 K	b ₁ r = s	
12	평면 c ₁	xOy 평면	c ₁ z = 0	
13	직선 b ₂	y축에 평행하고, K	b ₂ x = 0.20.811	
14	점 C ₁	b ₁ , c ₁ 의 교점	C ₁ = 0.0	
14	점 F ₁	b ₁ , b ₂ 의 교점	F ₁ = 0.0	
15	직선 b ₃	y축에 평행하고, K	b ₃ x = 0.20.811	
16	직선 l	x축에 평행하고, K	l x = 0.0	
17	점 G ₁	b ₁ , l의 교점	G ₁ = (-5.02, 0.0, 0.0)	
17	점 H ₁	b ₁ , l의 교점	H ₁ = (-5.02, 0.0, 0.0)	

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