2024-2025

Greening the Smart Oasis of Tomorrow

How "Design Empathy" Nurtures the Architects of Future Living

LED BY:

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Executive Summary

"Design Empathy" is an interdisciplinary, project-based program on climate resiliency, smart city design, and community engagement. This program is spearheaded by Professor James Ehrlich of the Center for Compassion & Altruism Research & Education (CCARE) at Stanford University. In partnership with Regen_U and ReadyAI, "Design Empathy" aimed to popularize climate education and AI literacy by deploying experiential learning methods and cutting-edge technologies, namely, VillageOS™. Manifesting CCARE's ethos, "Design Empathy" espouses Dr. James R. Doty's mindfulness practices throughout the course, engaging participants in wellness routines that cultivate deep empathy with nature and with each other.

During the 2024-2025 academic year, "Design Empathy" successfully launched its Summer-Autumn iteration in MISK Schools, Riyadh, Saudi Arabia. 34 middle and high school students actively partook in hands-on projects, brainstorming and prototyping their unique designs for a "Smart and Resilient MISK City." Through collaboration and communication, boys and girls all demonstrated remarkable teamwork, sophisticated climate knowledge, and adept technical fluency. Upon commencement in mid-November 2024, 7 students brought their finalized masterplan - rendered via VillageOS™ - to the Cityscape Global Congress, where they presented their MISK City blueprint to real estate and urban planning professionals.

"Design Empathy" has inspired more than 30 young minds in climate actions and digital solutions. Students' elevated academic interest and career readiness mark the tremendous momentum of "Design Empathy" in driving forward SDGs localization. Further, "Design Empathy" demonstrates broad applicability and inclusivity, benefiting students of all genders in cultivating environmental stewardship and digital fluency. Entering 2025, "Design Empathy" will further embed itself in Saudi Arabia's school system. The program will amplify its profound impact through long-term collaborations with multiple schools and organizations in the country and beyond. With this imminent success, "Design Empathy" will nurture tomorrow's changemakers towards greener, smarter, and more resilient urban communities around the globe.

James Ehrlich - Stanford University
Roozbeh Aliabadi, Ph.D. - ReadyAI

About

The world is fast approaching the watershed year of 2030 for achieving the United Nations' 17 Sustainable Development Goals (SDGs). At this critical moment, new and smart approaches to hitting the benchmarks have never been more urgent. The 2024 UN Habitat report proposed urban regeneration as the harbinger of SDGs localization. This multifaceted integrated concept champions the development of smart and sustainable cities, driven by big data, artificial intelligence (AI), and the Internet of Things (IoT). Forging climate resiliency and community solidarity, urban regeneration enlightens a new pathway towards societal welfare, human health, infrastructural robustness, digital transformation, and knowledge economy. It is against this backdrop that "Design Empathy" - a series of project-based lessons on sustainability and smart city design - anchors its implementations.

Nestled at the heart of Saudi Arabia, Riyadh pins down a land of opportunity with its resource-rich ecosystem and fast-growing digital landscape. In the light of the Saudi Vision 2030 agenda and the Central Riyadh Regeneration (CRR) program, the city is the optimal backdrop for climate initiatives powered by advanced technologies. Centering SDG 4 "Quality Education," "Design Empathy" strategically positions its first iteration in the renowned MISK Schools. The program aims to empower a cohort of aspiring Saudi students in smart urban planning, driving early acquisition of climate knowledge and digital upskilling with its state-of-the-art masterclass and cutting-edge technological integration.

"Design Empathy" embodies the joint effort across academia and industry. The program is led by Professor James Ehrlich of the Center for Compassion & Altruism Research & Education (CCARE) at Stanford University. Joining forces with industry experts from ReadyAI and Regen_U, "Design Empathy" blazes the trail in forging the school-to-career pipeline for young students in Saudi Arabia. Over the course of Summer and Autumn 2024, "Design Empathy" has successfully empowered more than 30 students from MISK Schools in terms of sustainability knowledge, problem-solving with AI, socioemotional development, and job readiness. Carrying on with its imminent achievement, "Design Empathy" strives for pioneering SDGs localization across Saudi Arabia and around the world.

Key Personnel
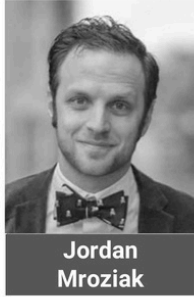

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Director Sustainability
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Software and Technology

CIO ReGen Villages
Stanford Digital Libraries
JAVA Software Developer
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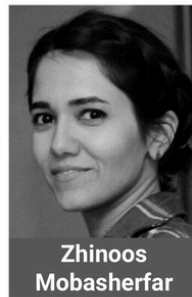
Jordan Mroziak
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Alex Albinus
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Regenerative Design
ReGen Villages Holding
Architect, Chester Nielsen
Architect, Fougeron Group
Astigarraga y Lasarte
Arquitectos

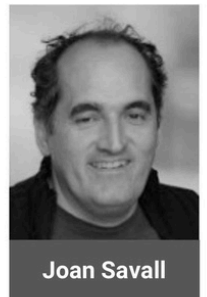**Zhinoos Mobasherfar**
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Freelance Architect
Zev Design & Build
Pulsarpart Company
NJP Engineers
Raya Design

Ramya Sivaprasad
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Executive Director
Condor Builders, Dubai
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PhD Robotics
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Instructors

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Back row right to left:
James Ehrlich, Joan Savall, Zephyr Simus, Roozbeh Aliabadi, Hillal Kara-Ali

(Image Courtesy of MISK Schools)

Mission and Vision

MISSION

In close alignment with the UN SDG benchmarks, "Design Empathy" carries on the mission to harness early adoption of climate awareness and digital literacy via quality education.

Through academia-industry partnerships, "Design Empathy" is dedicated to strengthening a dynamic ecosystem worldwide interwoven with sustainable development, technological innovation, and knowledge economy.

VISION

At the core of "Design Empathy" is to envision a climate-resilient, self-reliant, and culturally vibrant urban hub powered by the most advanced AI technology.

Program Synopsis

(Summer-Autumn 2024)

Key Objectives

Enhancing environmental awareness

Climate resiliency, urban regeneration, and sustainable practices;

Promoting digital literacy

Through hands-on experiences with AI software, robotics, and 3D modeling;

Honing socioemotional assets

Teamwork, efficacy, empathy, and entrepreneurship.

The "Design Empathy" Summer-Autumn Program is an intensive, project-based certificate course cultivating climate literacy and technological fluency among 34 high school students (aged 12-17 years old) from MISK Schools. Role-playing as institutional urban planners, students were tasked with brainstorming and prototyping a hypothetical "Smart & Resilient MISK City" adjacent to their campus. In the summer portion, students worked in a gender-separated setting. Boys and girls formed into two teams to pitch their respective plans. In autumn, the students came together in one mixed cohort, synthesizing the two plans into one masterplan for the final presentation at Cityscape Global Congress.

Overview

Covering interdisciplinary themes of geography, ecology, urban planning, and information technology, "Design Empathy" scaffolds its course content around regenerative and circular principles. The overarching theme is deploying empirically proven technologies to mitigate environmental degradations on the neighborhood level. The blueprint for building a smart and resilient town consists of the essential features as follows:

- **Green infrastructure**, facilitated by smart connective transportation system and off-grid energy-efficient facilities;
- **Land-resident synergy**, fortified by robust soil health and practices of permaculture;
- **Self-reliance and self-sufficiency**, enabled by access to clean water, organic food production, and renewable energy sources; and
- **Clean urban residence**, supported by optimized waste management and upcycling.

1 Green Infrastructure

2 Land-Resident Synergy

3 Self-Reliance

4 Self-Sufficiency

5 Clean Urban Residence

Summer program theme: "Design a Resilient & Smart Town in Misk City "

A unique feature of "Design Empathy" lies in its incorporation of mindfulness practices and team-building activities, alongside passing down textbook knowledge. Each morning, students gathered for a virtual meeting with Dr. James R. Doty, founder of CCARE and author of "Mind Magic." Dr. Doty guided students through routine meditation rooted in compassion, empathy, optimism, and altruism. These practices helped students to forge their agency, fulfill their common goals, and foster communal support as opposed to self-interest. Dr. Doty's mindfulness sessions laid out the psychological foundation for the team-building activities later in the program. Students collectively planted a community tree in their school's backyard, thereby deepening their connections with nature and with each other.
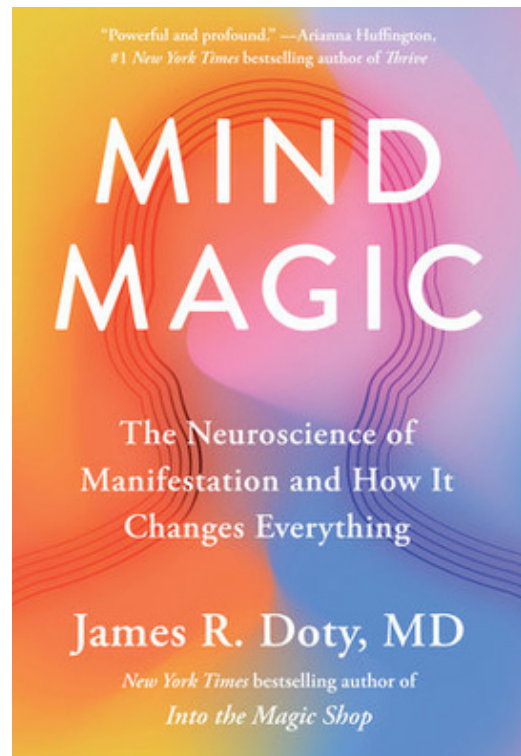
Summer Phase (June 8-14, 2024)

Students kickstarted their inquiry into climate resiliency by collaborating on shoebox-sized prototypes of passive homes. These mini-homes were installed with data-collecting sensors to monitor outdoor temperature changes. Based on the data, students evaluated the robustness of their designs. Mini-workshops lasting 15-40 minutes facilitated students in trouble-shooting and fine-tuning. Equipped with resiliency knowledge and design thinking skills, students entered the next chapter of smart town planning.

In the design workshops, boys' and girls' teams collectively imagined – and co-created via foam core cutouts – what their ideal towns would look like. Their designs encompassed residential, recreational, ritual, business, and cultural districts. Students worked with professional architectural maps (at 1:1000 scale) for them to start exploring the best placement for key infrastructures and maximized accessibility. To improve the quality of life, students also brainstormed lifestyle amenities and necessary building types that enhanced urban vibrancy in MISK City. Once the students had a rough outline of main components in their town design, they measured and scaled the mapping sheet. Then, they carefully cut out shapes of buildings and infrastructural pieces using hot-wire foam cutters to lay out on top of their paper maps for their physical diorama prototypes.

To deepen students' understanding of climate resiliency, modular hands-on units familiarized students with permaculture, soil types, waste-to-resource systems, and renewable energy microgrids. For example, students examined soil and sediment samples from local areas around their campus. They observed the samples under microscopes to tease out the main components and organisms in each soil type. Additionally, they attended lightning talks on geology in their region and across Saudi Arabia. Students not only learned more about the soil profiles germane to their town plan, but also about the historical background that shaped their local ecology. These modules assisted students with localizing and optimizing their town designs.

Additionally, students looked for innovative ways that digital devices, robotics, and AI solutions could reshape residents' lives. Through a set of daily sub-units, they learned about how data information was collected, processed, and (re)produced. Articulated by Dr. Roozbeh Aliabadi (ReadyAI), Dr. Jordan Mroziak (ReadyAI), and Dr. Joan Savall (Stanford University), lightning talk lectures on robotics, IoT, and AI introduced students to the building blocks of future-ready urban hubs with enhanced connectivity and efficiency. Running concurrently during the week, students leveraged SketchUp software platform, an accessible digital tool, to envision their smart city prototypes. SketchUp training was reinforced each day so that students could fledge out and configure their physical diorama layouts into 3-dimensional digital models. After the SketchUp smart rendering, students worked with Twin Motion, an animation software, to delineate higher-fidelity rendering, shading, texture mapping and animation sequences. Their deliverables presented fly-through town plan animations, including simulations of time-lapse lighting spanning between daylight hours into evenings.

On Graduation Day, boys' and girls' teams showcased their innovative outcomes and learning through dynamic presentations. Students prepared compelling PowerPoint presentations featuring multimedia artifacts and visualized data. The slide decks captured their design decisions and the collaborative process, supported by well-crafted scripts expressing their reflections on the final outcomes. Boys and girls presented their distinct concepts separately to permitted audiences, skillfully explaining their physical dioramas and displaying live demos of the Twin Motion prototypes. Students were awarded with Certificates of Accomplishment from CCARE and MISK Schools, accompanied by warm congratulations from Dr. Steffen Sommer (MISK Schools Managing Director), Prof. James Ehrlich (Stanford University), and a pre-recorded congratulating message from Dr. James R. Doty (Founding Director of CCARE). This milestone marked a celebration of the students' creativity, teamwork, and dedication.

For more highlights, see this recap video: link

Autumn Phase (September - November, 2024)

Building on the summer phase, 7 selected students (4 girls and 3 boys) refined their town designs through deeper engagement with advanced analytics and AI-powered tools such as VillageOS™. Weekly one-hour Zoom sessions included collaborative discussions, critical analysis, and data-driven decision-making to optimize the town plan for environmental sustainability and community well-being. Students were tasked with unifying their respective virtual town plans to be showcased at the Cityscape Global Congress in Riyadh (November 11–14, 2024). They deliberated on key elements, including road infrastructure, community amenities, housing types, and essential facilities such as spiritual centers, emergency services, and commercial areas. Roundtable discussions encouraged consensus-building, with each team member presenting ideas for approval by the unified group. This collaboration laid down the groundwork for an integrated digital town plan simulation.
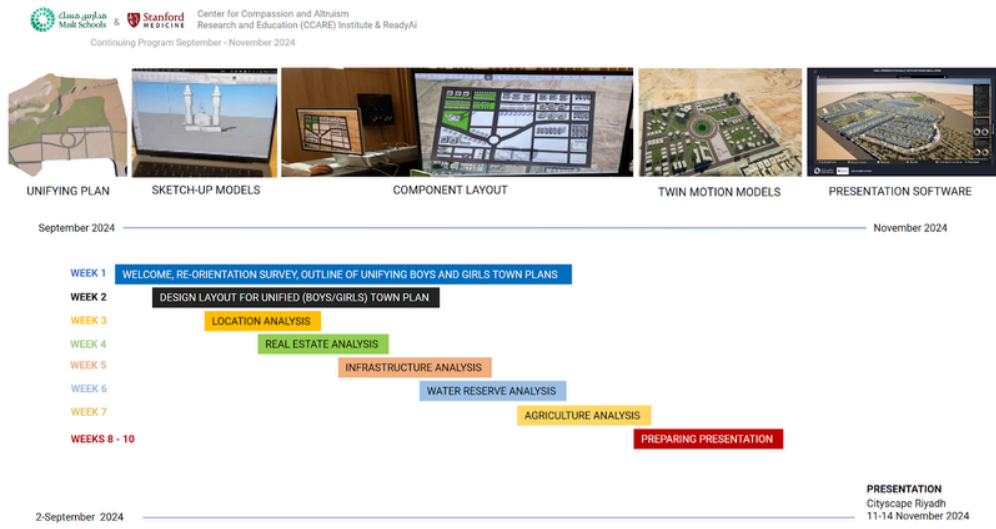
During the autumn session, students engaged more with data analytics and AI or machine learning software. In a Google Sheet document, they collected and compiled data on natural capacity, resource flows, and demographics, which informed them of the optimal housing population with maximized comfort and resiliency measures. This data served as the baseline for the final digital model simulation. Besides, students audited extensive lecture sessions on climate modeling, demographics, and financial feasibility in urban planning. Expert insights from Stanford real estate professionals enriched the students' understanding of mixed-use residential and commercial developments.

Upgrading from Twin Motion, students rendered advanced simulations using VillageOS™, an AI-powered software for dynamic predicative model visualization. This smart system enabled students to program and reify complex town designs based on real-time climate and typological analysis. VillageOS™ accelerated holistic assessments of local landscapes, resource abundance, climate dynamics, and economic trends. A metrics-driven and LLM-installed dashboard displayed up-to-date SDGs and climate indexes, evaluating the overall performance of the design through these crucial UN benchmarks. The application of VillageOS™ ensured the technical robustness and visual appeal of the finalized MISK City masterplan.
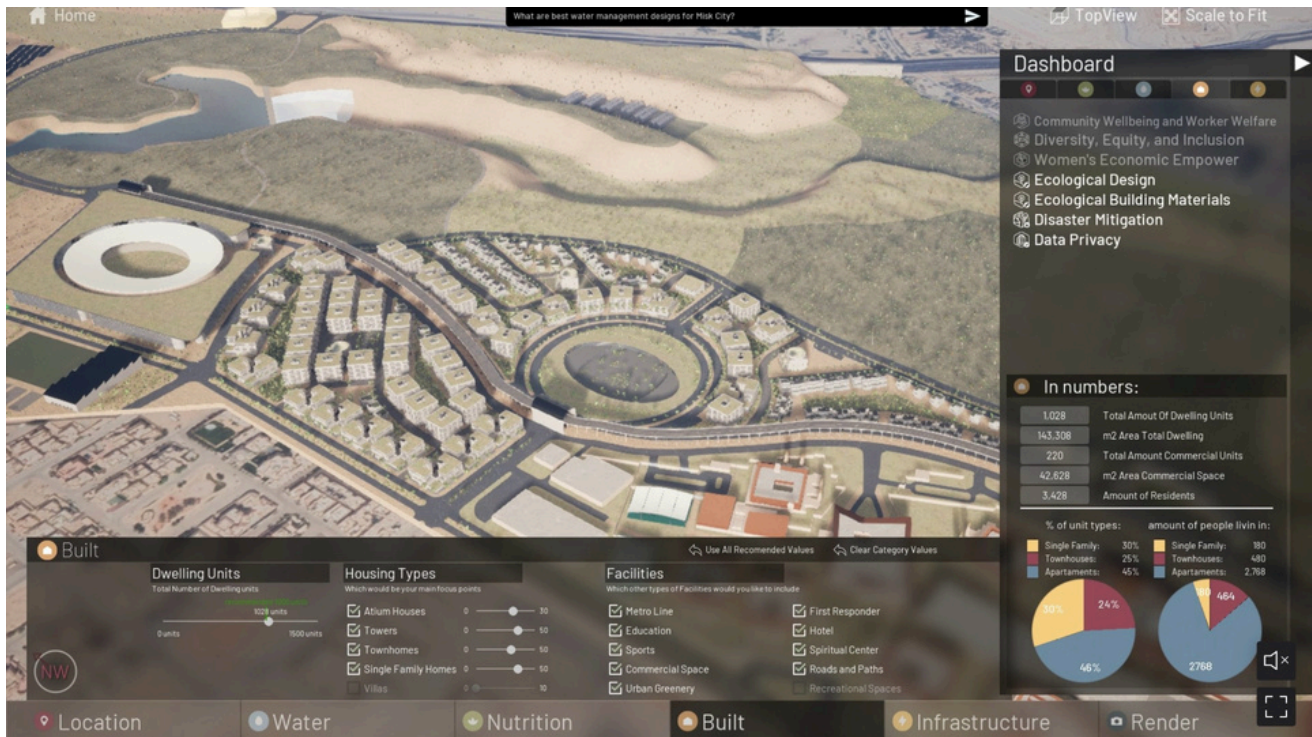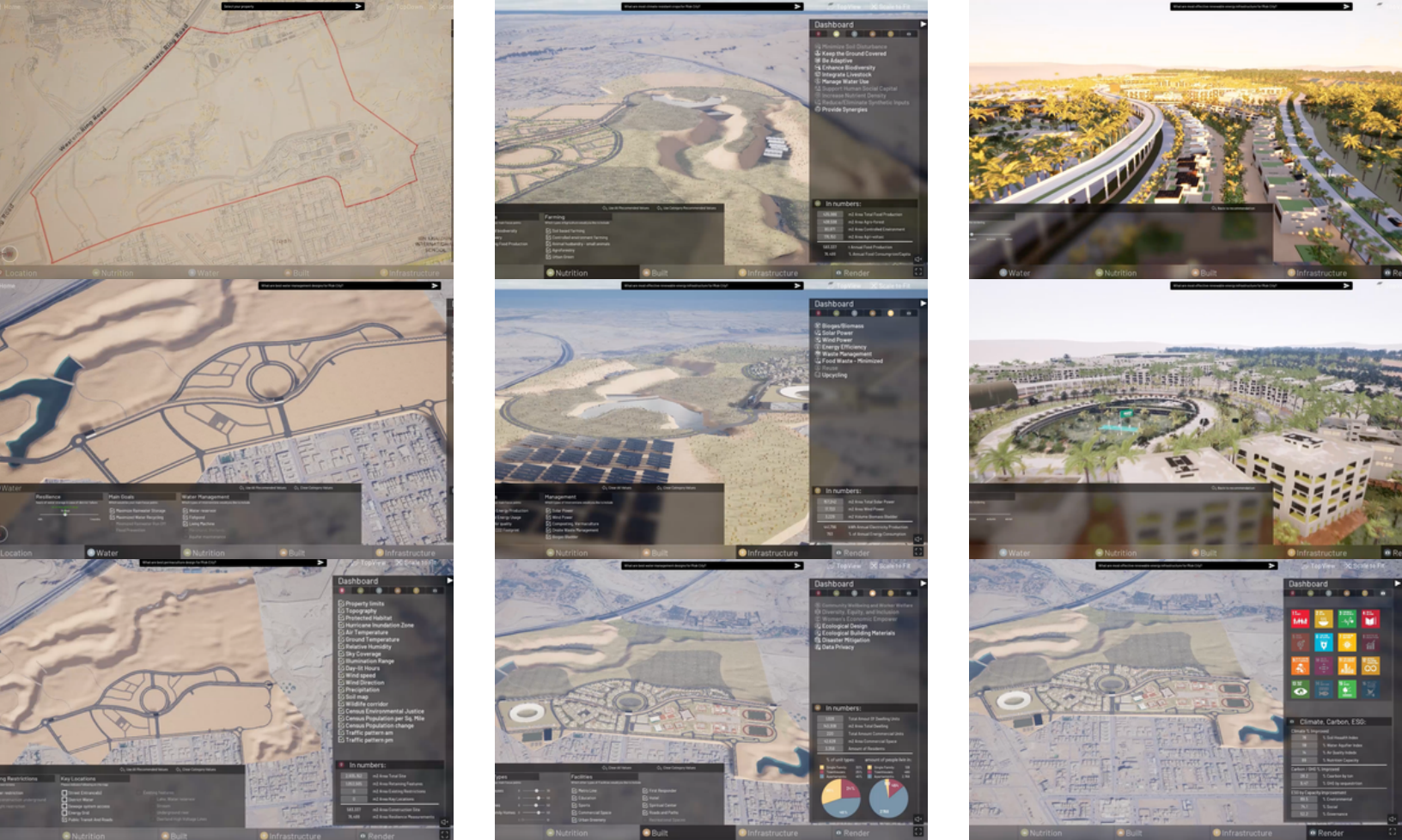
VillageOS™ Interface Demo

The template structure programmed into VillageOS™ was organized into the following categories:

- **Climate Analysis**, based on location and infrastructure connectivity;
- **Water**, including reservoir, aquaculture and waste/resource conversion that establishes resiliency measurements;
- **Nutrition**, i.e. how and where the land and soil profiles can best take form in order to produce agriculture, farm animal husbandry, and greenhouse cultivation;
- **Building**, providing a simulation of building and housing types, as well as a dynamic display of feasibility percentages in the form of animated pie charts;
- **Infrastructure**, displaying integrated renewable energy systems and services such as solar arrays, rooftop solar, wind turbines, biomass/biogas, and battery storage systems - as well as a range of number of days for resiliency in case of district interruptions;
- **Render**, outputting beautiful Twin Motion animations that also simulate time of year, including weather patterns, rainfall and fluid dynamic models; and finally,
- **ESG, SDG, and Climate Dashboard** that can assess the overall performance of the design through these critical U.N. and global metrics.

READYAI

Upon commencement, students collaborated on crafting a script and rehearsing their presentation for Cityscape Global Congress, one of the world's largest real estate conferences. At the conference, students navigated the simulation software, swiftly adapting their presentations to engage diverse audiences. They printed and laminated their scripts for professional handling and self-organized into designated roles. Their confidence grew with each presentation as they skillfully led the Q&A sessions with incoming attendees. Students showcased their remarkable teamwork and professionalism applicable to their future academic and professional pursuits. Through their engagement with advanced tools, data-driven modeling, and professional presentation experiences, they embodied the course's core principles and design excellence, leaving an unforgettable impression on various stakeholders at the convention. The presentation marked not only the culmination of "Design Empathy," but also exemplified the program's real-world relevance.
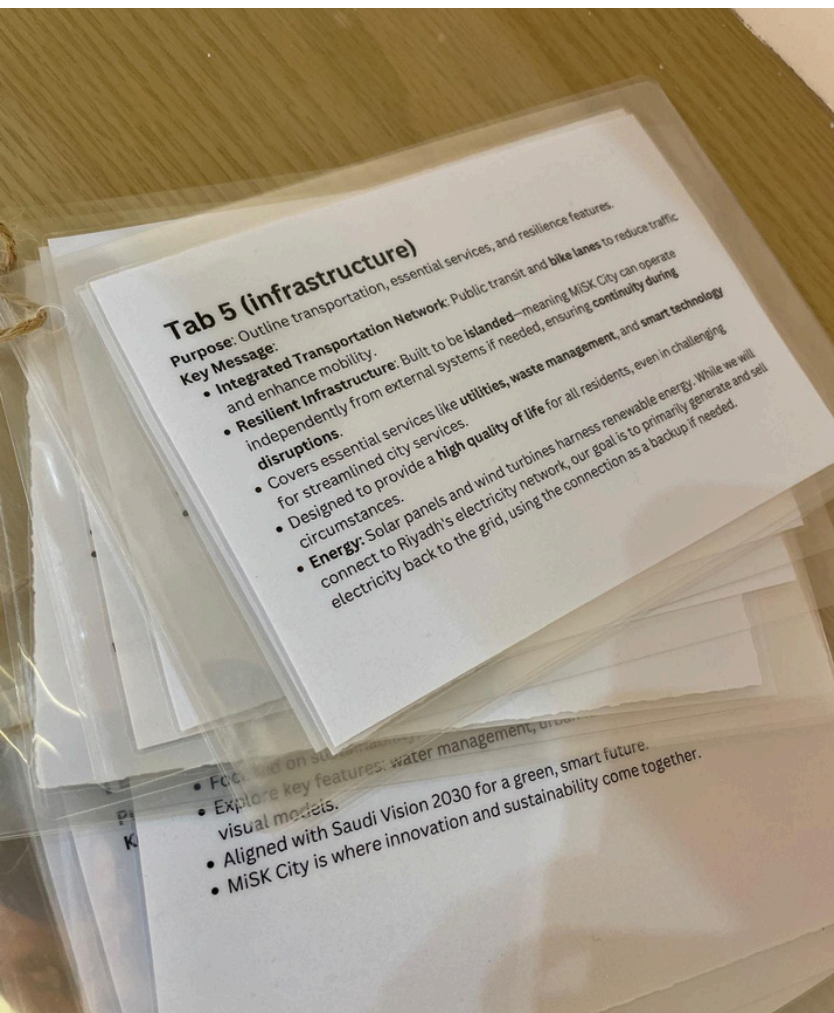
Impact Assessment

Measured Construct	Outcome	Implication
Knowledge in Sustainable Development & AI	Improvement	Significant increases were observed in female and male students' knowledge scores post-course.
Interest in Learning	Enhancement	Both genders showed a substantial rise in interest in sustainability and AI.
Attitude towards SDGs & Digital Literacy	Positive Shift	Students' attitudes toward sustainability and AI improved markedly.
Comfort with Sustainability Topics	Greater Ease	There was a notable increase in students' comfort with discussing and engaging in sustainability topics.
Career Preparedness in Sustainability & Technology	Job-Ready	Students demonstrated a significant growth in their interest in pursuing sustainability-related careers.
Gender Analysis	No Disparity	The course was equally beneficial for both genders.

Conclusion "Design Empathy" effectively enhanced students' knowledge, interest, attitudes, comfort, and career interest in sustainability. Minimal gender disparity underscores the course's inclusivity and broad applicability.

The "Design Empathy" summer-autumn program demonstrated measurable success in enhancing students' climate literacy, digital skills, and interest in sustainability. Metric-based surveys on 31 respondents revealed significant gains across all domains, including knowledge of climate resilience, interest in learning, attitudes towards sustainability, comfort with climate education, and career preparedness. Thanks to the enriching hands-on activities and supportive mentorship from stellar instructors, both boys and girls were able to excel and thrive in a constructive learning environment. The immediate growth in climate and digital literacy directly indicates the effectiveness of "Design Empathy" in accomplishing the mission of education for sustainable development.

"Design Empathy" has not just deepened knowledge acquisition but also elevated students' interest in exploring sustainable development and digital solutions. The foundational role of PBL and collaborative learning cannot be overstated. Participatory frameworks actively engaged students in every stage of learning, thereby sustaining their passion for the subject matters. "Design Empathy" centered students' cultural backgrounds and funds of local knowledge throughout its course design. Learner-driven methods ignited students' agency to explore and experiment, bringing students closer to climate topics and thus keeping their passion alive. Once students have established the source of motivation, "Design Empathy" can obtain tremendous momentum in continuing its efforts.

Students have demonstrated a positive shift in their attitudes towards environmental and digital knowledge. Concurrently, they have found themselves navigating the course with greater comfort and confidence. Students have forged self-efficacy, resilience, and entrepreneurial mindset constructive for their personal and professional development. Beyond raising awareness, the program embeds SDGs into practical field training, encouraging students to translate their understanding into actionable solutions. "Design Empathy" nurtures teamwork and creativity, the building blocks of youth-led climate initiatives on a neighborhood level. The success of the program underscores the early start in building climate literacy and invaluable psychological assets.

A defining factor in the program's success is its healthy and supportive culture of sustainable learning. Students worked in closely-knit groups under sophisticated mentorship. Collaborations offered students meaningful peer interactions and personalized learning experiences. Through role-playing as urban planners, students co-designed their smart cities in a highly flexible and immersive learning environment. Morning meditations, team-building exercises, and symbolic activities like tree planting further cultivated empathy and mutual understanding among participants. These elements reconciled power imbalances and thus bolstered the congruence within the cohort. This supportive and dynamic atmosphere establishes a psychological safety net for students. "Design Empathy" is not just an educational initiative, but a thriving space for all students as agential learners, empathic listeners, innovative problem-solvers, and impactful leaders.


Notably, "Design Empathy" has provided students with a headstart in career development. Students have grown more fond of jobs related to sustainable development and emerging technologies. Course content is not the sole driver of their enhanced career readiness. In fact, academy-industry partnerships play a pivotal role in guiding students toward meaningful career pathways by connecting them with experts and professionals in industries such as SDGs and smart governance. Through keynote speeches from distinguished instructors, students have gained invaluable mentorship experiences that sharpen practical skills, such as design thinking, critical inquiries, and technical fluency. Face-to-face interactions with experts also open doors to critical networking opportunities for myriad occupational possibilities. Within a supportive ecosystem of upskilling, "Design Empathy" fosters multistakeholder partnerships that accelerate students' career preparedness.

One important feature of "Design Empathy" is to broaden the participation in climate and digital literacy. The summer-autumn iteration looked into the gender dimension. The comparison between boys and girls indicates little to no statistically significant differences in their learning outcomes, experiences, and job readiness. This result provides further proof for two noteworthy takeaways:

1. Both boys and girls can equally benefit from a project-based curriculum like "Design Empathy"; and
2. Girls are just as efficacious and capable as boys in mastering climate knowledge and technical skills.

This finding signals a break from the conventional understanding in gender differentiations in climate and AI education. "Design Empathy" exemplifies the empowering nature of continuously providing equitable opportunities across all identity groups. By closing the opportunity and achievement gap, "Design Empathy" strives to harness diversity and inclusion through quality education.
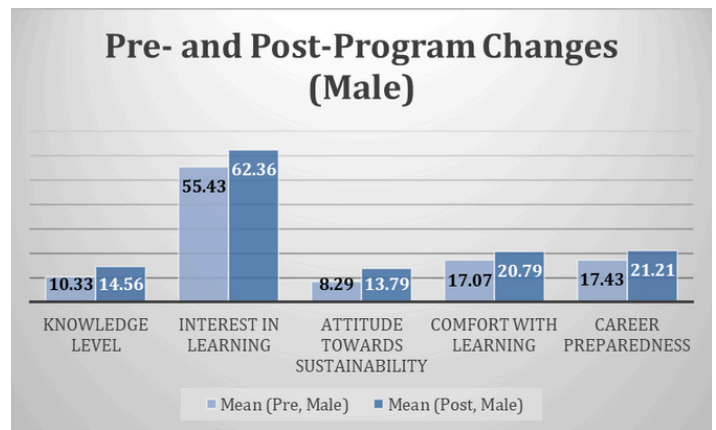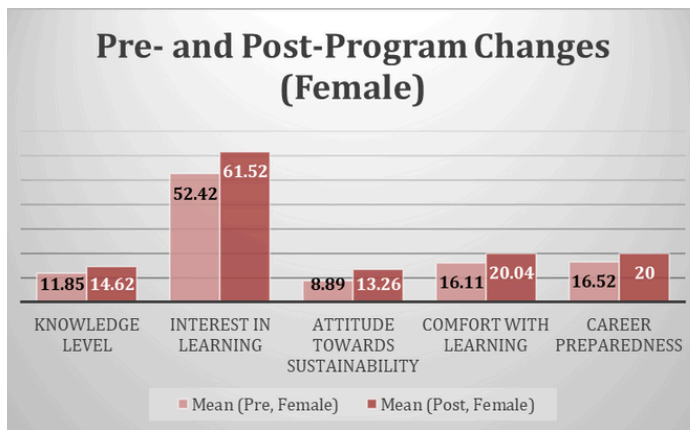
"Design Empathy" has demonstrated tremendous potential in deepening sustainability education and AI literacy training. Its high inclusivity and broad applicability facilitates future iterations at multiple school locations with diverse participants. The providence of lifelong learning opportunities will fortify students' retention of knowledge and skills; the continuation of student projects will foster community-driven efforts of climate resilience; the combination of textbook knowledge with hands-on experience will facilitate students' career development. Above all, "Design Empathy" forges the highly skilled human capital essential for substantiating the SDGs.

FUTURE CONTENT

The next phase for Design Empathy is to scale up its initial thrust, further embedding itself in Saudi Arabia's school curriculum and sustaining its lasting impact within and beyond the local community. Entering 2025, "Design Empathy" will take the following steps to amplify its significance:

- **Longitudinal Iterations**, extending the stand-alone summer workshop to semester-long, recurring coursework with periodical assessments on performance and interest level;
- **Systemic Integration**, forging consistent ties with schools and organizations in Saudi Arabia and internationally to engrain "Design Empathy" lesson plans into standardized school curriculum;
- **Diversification of Participants**, recruiting a more diverse cohort of participants of various cultural, demographic, and socioeconomic backgrounds to broaden program impacts;
- **Multisite Expansion**, contextualizing "Design Empathy" in various geographical locations to deepen localized practices and inform design-based refinements;
- **Deepening Real-World Relevance**, funneling students in academic and professional venues (e.g. AI and climate-related conferences, competitions, and career fairs) that showcase program deliverables and provide networking opportunities for students' career pathways.

Furthermore, "Design Empathy" plans to scale up its design scope to cover all K-12 grade bands, as well as extending to professional development and vocational training. This systematic course packaging offers lifelong learning opportunities in SDGs, AI, and crucial 21st century skills. For young learners, "Design Empathy" is an invaluable platform for nurturing "whole children," highly competent and self-motivated. For professionals, "Design Empathy" boosts career development by strategizing green businesses and harnessing organizational congruence. These measures will bring "Design Empathy" to wider audiences, augmenting its practical soundness, technical robustness, and societal influence.

CONCLUDING REMARKS

Espousing the ideals of education for sustainable development, "Design Empathy" is dedicated to its continuous providence of equitable access to expert-led and thoughtfully executed education for all students. The 2024 Summer-Autumn iteration has successfully inspired 34 young minds in innovations for environmental and social good. The assessment has proven the course as not only an accelerator in knowledge acquisition, but also a catalyst for national development. "Design Empathy" revamps Saudi Arabia's climate education by leveraging its data-driven, impact-focused, environment-minded, community-based, and people-centered curriculum. Amplifying its presence in Riyadh and beyond, "Design Empathy" nurtures the architects of the future - active in environmental stewardship, adept in advanced technologies, and ambitious in societal transformation.

LINKS

- **UN Habitat 2024 Report - Urban Regeneration for Localizing the Sustainable Development Goals:** https://unhabitat.org/urban-regeneration-for-localizing-the-sustainable-development-goals
- **Saudi Arabia Vision 2030:** https://www.vision2030.gov.sa/en
- **"CCARE design course at Misk Schools in Saudi Arabia" by James Ehrlich:** https://ccare.stanford.edu/ccare/design-empathy-misk-schools/
- **"RegenVillages – Integrated village designs for thriving regenerative communities" by James Ehlich, Larry Leifer, & Chris Ford:** https://sustainabledevelopment.un.org/content/documents/622766_Ehrlich_Integrated%20village%20designs%20for%20thriving%20regenerative%20communities.pdf
- **"ReGen Villages: Development of Design Features & Software Applications for Integrating Regenerative Lifeline Resource Systems in Residential Communities" by James Ehlich, Larry Leifer, & Chris Ford:** https://www.academia.edu/38222804/ReGen_Villages_Development_of_Design_Features_and_Software_Applications_for_Integrating_Regenerative_Lifeline_Resource_Systems_in_Residential_Communities
- **James Doty on the neuroscience of manifestation (Stanford Report):** https://news.stanford.edu/stories/2024/05/james-doty-on-the-neuroscience-of-manifestation