

The Impact of Convictions on Interlocking Systems

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ABSTRACT

What gives a researcher the conviction that a project deserves the time spent collecting data—or does the data itself inspire the research? Conviction, in this context, refers to the confidence that the data will potentially inform or enhance the work in a given field (a system). While objectivity about the collection process itself requires integrity, the decision to apply for funding and move forward require this more elusive sense of

Discussions about integrity in research assume a universal standard, but only recently have studies examined the varied interpretations of “integrity.” More than a moral code, more than a lack of statistical bias, to most researchers, integrity may imply response to an undefinable sense of “truth” (Shaw, Satalkar 2018). Today’s constantly changing conditions remain fraught with decisions about topical relevance, questions of bias, and the caution not to act on outdated statistics that confirm our worst assumptions and confuse questions of “truth” (Rosling 2018).

This paper draws on research in systems theory, health informatics, environmental and behavioral science, and transdisciplinary education to define an analog for long-term research in which the data itself inspired the conviction to sustain a project with counterintuitive data. Once set in motion, the pattern of sustainability redefined expectations, thus launching parallel research—imitable patterns of hopeful action-surrounding systems, each driven by new observations and

In these transdisciplinary examples, decisions to expand problem-solving contexts or hypotheses resulted from an analog built loosely on these steps: Statistics-gathering; Collaboration and interpretation of data; Conviction of a need to replicate the results, based on the data; Adaptation of the project (and the thinking) based on the data; Stakeholder actions based on confidence in the data; Long-term impacting one field; and finally, Mimicry or movement in parallel fields of research or institutions or locations, based on the results of the prior steps.

In the best-case scenarios cited, a project grounded in data affirms hope and leads to resilience or sustainability over time and across disciplines and interlocking systems (Goodall, 2021, Rosling, 2018, Ribeiro 2021, Langness 2020, Platt 2022).

Key Words: Systems, Health Informatics, Environmental Sciences, Service-Learning, Transdisciplinary Education, Research Integrity, Convictions

1. INTRODUCTION

Do successful systems work longer and harder with energy exhumed from parallel sustainable systems? To answer these questions, this paper offers a rough analog for transdisciplinary

examples, research projects or academic programs fueled by data and convictions.

The analogic premise: A problem-solving model can influence not only its intended purpose but those of surrounding systems based on the integrity of a six-pronged process, in which its “already realized vision” continually renews a commitment to explorative action. While each step of the project may appear by another name, the model typically involves some variation of: 1) collection and updating of data, 2) layering ideas through collaboration; 3) willingness to shift gears and adapt to unexpected data; 4) deepened convictions of the project’s value based on customizing data to on-the-ground needs; 5) sustained action inspired by these convictions; and 6) impact not only on the problem but on the surrounding systems or parallel contexts.

We may assume, a priori, that a project could lose its luster in the absence of robust data or the willingness to adjust and change course, or the confirmation and convictions that arise from continual action and impact. When all the elements co-exist, however, and when transdisciplinary models intersect, the findings not only transform their existing ecosystems but may turn the gears of parallel analogs, through subliminal inspiration for systems outside their own. The paper draws from several fields, including organizational systems, informatics, the sciences, and education itself, to illustrate the analog.

2. ORGANIZATIONAL PRINCIPLES

Peter Senge, a Systems scientist, aerospace engineer, and MIT lecturer, wrote *The Fifth Discipline*, last revised in 2006, to define how human interactions create systems for successful problem-solving. His “Ladder of Inferences” had shown how interpersonal mental models continually shift in the face of new information. This larger context, intended especially for schools of business management, defined organizational behaviors that respond to the same pattern. (Senge 2006, Mantelow 2016) He defined the disciplines as personal mastery, a shared vision, a team approach, and willingness to shift these mental models in search of a system superior to the sum of its parts, leading to ultimate systems thinking. The routine became a playbook a systems approach to harmonizing learning organizations, whether in academia, business, or civic organizations. Its concepts became a lingua franca, of sorts, to bring economic and academic conversations into the realm of less formal learning organizations, earning Senge the title “Strategist of the Century” by the Journal of Business Strategy (September/October 1999). The designation was intended to refer to one of the 24 people whose ideas most influenced the way organizations operated in the 20th century. Senge emphasized vision and values as essential to fostering “a long-term orientation and an imperative for learning” (Senge 2006). The other disciplines he described more situational, mastered in relation to the vision-based process the leader has designed. (Smith, 2016)

3. HEALTH INFORMATICS – BELIEVING THE NUMBERS

Sweden's recently belated Hans Rosling contributed another example of an analog based on a strong vision or conviction at its center. He challenged students to move beyond "us and them" mental models by updating data to inform the thinking and planning process. Over his long career as a statistician, global physician, and professor of public health, he documented rapidly improving markers of health and well-being that have largely erased the boundary between "developed" and "developing" societies over the past two decades, a period of unrivaled improvements in the longevity of humans and their movement from extreme poverty toward the middle class (Rosling, Roslin and Ronnlund, 2018). Statistics deepened his conviction that these improvements should leave us hopeful and help us act appropriately in the world of academia and in the real world.

This system-changer discovered the value of his "factfulness" approach earlier in his career, when he worked as the public health official in an impoverished district of Mozambique, assigned with the mandate to reduce the infant mortality rate. A visiting doctor insisted Rosling should spend more time saving each infant in the hospital, but Rosling used hard data—the number of deaths per births in the district—to confirm the wisdom of instead spending more time training a prevention team to reach the thousands of sick children before their diseases became life-threatening. (Rosling, Roslin, and Ronnlund, 2018).

Both researchers held strong convictions about preventing child deaths, but when Rosling searched the birth and death records to accurately quantify community needs, his instincts prompted his convictions, subsequent actions, and deep impact. He ultimately contributed to the decline of infant deaths in the region, proving the value of data over drama (Rosling, Roslin and Ronnlund, 2018).

This researcher knew that statistics mattered. His lifelong work inspired informatics specialists beyond public health, in other fields, to re-evaluate distortions and to convey truths to promote effective action, greater hope and broader impact. See Table II to picture the potential of this approach to shift the mental models in his field and beyond. Rosling (2018) wrote:

I love data only when it helps me to understand the reality behind the numbers, i.e., people's lives. In my research, I have needed the data to test my hypotheses, but the hypotheses themselves often emerged from talking to, listening to, and observing people.

Though we absolutely need numbers to understand the world, we should be highly skeptical about conclusions derived purely from number crunching.

The impact of his convictions on the World Health Organization, UNICEF, various NGOs, and 35 million TED talk viewers unlocked old systems and launched a new one, called the Gapminder foundation, to reverse deficit perspectives that move projects off target based on inaccurate facts. (Rosling, Rosling, Ronnlund, 2018).

4. SCIENCE AS A HOPEFUL ANALOG

When Louis Leaky selected Jane Goodall as a lone chimpanzee researcher in the Gombe desert, he wanted someone who would not be jaded by exposure to prior research (Goodall, Abrams, 2021). She started her observations as a novice but became the best-known scholar in her field, able to influence multiple systems with her refreshing research methods. Why? Her data changed the conversation about the potential roots of *human* behavior based on *chimpanzee* behavior. Animal conservations and green movements felt the tide of her hopeful approach to challenging observations of conflict and socialization, and resiliency in ecosystems and animal family systems alike.

Her anthropological work in a diminishing equatorial belt over decades years impelled her broader research on the relationship of deforestation and economic life for people struggling in the Gombe desert. Thereby the gears shifted for transdisciplinary research over her long lifetime, through the relationship of data, convictions, action, and impact.

Jane Goodall's writings and interviews identify hope as her main conviction. Her description of the "hope cycle" includes goals, pathways to achieve them, and the support of others. Her stories mesh data, collaboration, adaptation, action, and impact, but she infuses this primary conviction of hopeful action into each one. She justified her philosophy of hope with observations of "the human intellect," telling her biographer, "A chimpanzee will try to help another who is in trouble...but I think only we can perform an altruistic action even though we know it may harm us" (Goodall, Abrams, 2021). She recalled comparisons of ape warfare and incidents of altruism from her childhood, growing up during WWII.

Her second reason for hope came from the resilience of nature. She cited the example of a tree that survived at Nagasaki and also of a living branch from a pear tree rescued from the attack on New York's twin towers, which later resurrected itself. She had collected data on the adaptability of many species rescued from the brink of extinction (Goodall, Abrams, 2021).

She listed her third reason for hope as the power of young people, her collaborators. Tanzanian high school students first helped her to organize the conservation presence that now pervades communities and universities around the world. As a groundbreaker, she found her peers among the unjaded, in order to extend her impact (Goodall, Abrams, 2021).

Goodall cited her fourth reason for hope as the indomitable human spirit. Her life as a traveling lecturer and activist reinforced the pattern of interpreting data, making impact, and deriving from this process hope for the health of all species "while time permits" (Goodall, Abrams, 2021).

She described the distinctions between faith, optimism, and hope, regarding hope as the one that, for her, has translated into a cycle of actions that have indeed influenced parallel research fields and opened new windows into peace, conflict, and human behavior.

National Geographic has defined Goodall's impact on behavioral systems far beyond her original expectations, stating: "Ethologist and conservationist Jane Goodall redefined what it means to be human and to set the standard for how behavioral studies are conducted..." (Barber, 2022)

5. TRANSDISCIPLINARY SERVICE LEARNING AND SYSTEMS CHANGE

The third analogy lies in service-learning research models for higher education, particularly models based on a vision or theory, who seek to compile data, collaborate, evaluate and adapt, and confirm the convictions that invite action based on widespread data about impact.

As the three prior examples revealed, data collection alone, without a long-term vision, seldom inspires group reflection and mutual understanding of the purpose behind the action. In this example, identifying a shared vision or “conviction” that drives service-learning goals may influence whether institutions of higher learning can sustain the clear action needed to generate momentum and impact across interlocking systems.

For example, Italy’s Community Psychology students at the University of Bologna, conducted service-learning initiatives beginning in 2015. Parallel university-based projects soon sprang up across Italy, although not necessarily under the banner of service learning. The University of Bologna thus formed a system to align service-learning methodologies among departments as diverse as Chemistry, Politics, Social Sciences and Education in its Italian Network (Zani, 2019). Meanwhile, professors from the University of Verona began a five-year study in the recognition of this need to move higher education away from a “banking model” (Marullo, Ubbiali, 2017) with competences aimed at “individual success and economic improvement” and to lean toward awareness of education’s impact on society, especially on the needs prioritized in the UN Agenda for 2030. (Ubbiali, Mortari 2019).

In Spain, a “European Observatory” now unites 19 countries in an interlocking system of institutional support for the concept. Founded as a space to map data, exchange methodologies, and enhance the knowledge of service-learning in higher education across Europe, it aims to bring students closer to “social realities” and to promote civic engagement in real work environments.” (European Observatory, 2019). It features an extensive European survey, conducted in 2021, which showcased a need for institutions to further adapt and engage all stakeholders in the vision to realize their full impact. The report reflected that “...Institutions should foster students' critical thinking through meaningful S-L [Service Learning]. They must be supported in developing further social learning, local context learning, research and to consider the implementation of those contributions” (Ribeiro, Aramburuzabala, Paz-Lourido, 2021).

An analogous service-learning pattern surfaced decades earlier in the model set by Full-Circle Learning teacher training courses (Langness 2020, Platt 2022). The organization’s transdisciplinary service-learning theories had been tested by data, regional collaboration, adaptation, and action, which generated by convictions about what might produce consistent transformative impact. New data helped continually refined the training programs.

The FCL model imbues altruism studies and service learning into academic education. Universal patterns, customizable yet recognizable, turn the gears in surrounding fields of endeavor, where programs tend to not only improve education but to elevate skills in sustainable development, health education, and basic engineering, to name a few examples (Langness 2020).

The more transdisciplinary the impact, the greater the convictions of researchers to sustain action (Platt 2022).

In May 2022, a longitudinal study compared factors that had influenced Full-Circle Learning (FCL) learning over the length of its history. The printed data independently reviewed included reports from educators, students, community members and staff. Retrievable data covered twenty of thirty years of history and represented constituents in 35 nations.

The pattern of influences in Table I demonstrate that the mastery of personal ethics, social cohesion strategies, academics, and service learning each received 10-12 percentage points on the list of mentions among participant responses evaluated in the study. The significance of the altruistic identity of the learner increased to 14 to percentage points. An even higher number of mentions, 17 percent, showed the impact of service learning on the broader community as a feature that impressed participants even more. This came as the second highest mention after “before and after” statements. One outcome seems to incubate another in the transformation process.

The educational model hinges on these parallels between personal and group transformation, linked by cultivating a sense of conviction to act in response to humanitarian dilemmas.

The contiguous flow of student data over decades created fodder for adapting to the needs of the learning communities. The pedagogical stance in educator courses remained consistent, but local culture flavored the research projects. Strategies taught the relevance of education across the disciplines, while data collection, collaboration, and adaptation strengthened the regionally specific convictions of educator instructors in multinational locations and, therefore, the propensity to act and to generate impact.

6. TECHNOLOGY– NO NEW NORMAL?

If we presume that the exception proves the rule, the continually shifting norms and impacts in the field of information technologies presents a case in point. Even today’s retired professors would not likely have studied under the first teaching machine, adapted by BF Skinner in 1954 after its debut performance on lab mice (Smithsonian, 2022). However, a generation later, thought leaders and internet pioneers such as Alan November predicted technology would revolutionize learning by opening opportunities for student research, project-based learning, and expansive critical thinking skills—and it did (November, 1995). While he valued technology, as time went on, November considered “global empathy” an even more important skill than digital competency (November, 2017).

Today, the influence of technology on the woof and warp of society—and on the methods of conveying information in academia—have created not only shifting platforms but sometimes dancing protocols. Perhaps some of the systems don’t hold still long enough to lock gears!

Technology’s exponential rate of change has influenced higher education and general education in multiple ways. For example: 1) New studies now examine the shifting nature of instructor - student relationships where WhatsApp drives classroom communications (Ujakpa, 2018). 2) In one study, more than half of students surveyed wanted to see increased the

opportunities to express themselves not on paper or in oral discussion but via group chats in WhatsApp. (Veena, Loksha, 2016) 3) The call for online courses has sharply risen over several years, due to the flexibility it offers adult learners and working low-income students. (Dorn, Dua, Law, Ram, 2022).

Even before the pandemic, the percentage of new students participating in online courses rose, and now, without factoring in emergency courses, more than half of all college students took at least one online course in 2021, with the greatest increases in university enrollments occurring at online universities (Smalley, 2021). Computer science majors held steady, while some formerly popular majors fluctuated during the pandemic. The US Labor Department (2022) predicted that computer science jobs in academia, research, and throughout government and industry would grow by 13 percent from 2016-2026.

These shifts illustrate the need for ongoing research studies to track the influence of technology on higher education goals in a constantly changing world, as the impacts may shift faster than our capacity to forecast long-term trends. How will the new data affect the vision that drives convictions and collaborations? How will it suggest the next set of adaptations and hoped-for impacts? Will the coming years present as many surprises as the past? Will the data support an ongoing commitment to “global empathy” to guide academic uses of technology? Can the questions we build into the studies reflect not a *bias* but a *vision*?

7. THE ROLE OF CONVICTIONS

In Table II, convictions draw on data to produce sustained action and to thrust the gears of change into motion. Whether these convictions represent hopeful interpretations of data, beliefs supported by empirical evidence or mere enthusiasms confirmed by socio-emotional experience, the examples demonstrate their effectiveness in sustaining the relevance of a research study. In the final analysis, they may not prove the hypothesis, but at least they may survive long enough to fully map the response to the question. As Carl Jung (1991) wrote:

“Scientific criticism must, of course, adhere to the view that when something is held as an opinion, thought to be true or believed, it does not posit the existence of any real fact other than a psychological one. But that does not mean that a *mere nothing* has been produced. Rather, expression has been given to the psychic reality underlying that statement of the belief or rite as its empirical basis. ...every science reaches its end in the unknowable. Yet it should not be a science at all if it regarded its temporary limitations as definitive and denied the existence of anything outside them. No science can consider the hypotheses to be the final truth.”

The data that drives our curiosity and carves our convictions, far from creating certainties and yet far from aimless wondering, pushes the gears that help others find symmetry in their own search for answers to human problems. As systems interlock, perhaps none presents more elegant analogs than those whose designs mirror the natural growth and beauty of replicating cells or echoing waves at high tide. At these moments, the researcher enjoys the miracle of resonance and hope that Einstein described in synchronized systems when he wrote:

“The harmony of natural law...reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection.” (Einstein, 1944)

8. FINDINGS

- Regardless of the descriptions used, the most sustainable systems for research often feature a data-driven analog inking convictions or visions to results re-proven over time.
- Systems in which data drives the process of collaboration, self-evaluation/adaptation and renewed conviction and action tend to promote consistent impact.
- Sustained impact improves suggestibility and influence on interlocking systems, turning those convictions into norms.

9. CONCLUSIONS

Evaluating the implications of statistics on convictions, actions and impact will aid researchers who seek to revise outmoded paradigms, reinvigorate collaboration, and generate hope. The sustainability of this process, in cases of long-term projects, has inspired greater connections among researchers in sister systems.

Systems alignment readily appears among institutions that teach organizational leadership, health informatics, ethology, transformative education/service learning, basic academic courses, and hope theory, to name a few, while threats appear in the form of rapid change in some fields, such as technology. These research fields with unpredictable factors may still benefit from analogs that ask the data to answer *people-related* questions, which inspire the conviction to seek long-term answers.

Creating norms that value fact and data as tools to effectuate long-term change for *people and living beings* relies upon an analog that continually renews the relationships *within* systems and *between* systems.

Table I

Humanitarian Education Systems and Resilient Identities

A Full-Circle Learning Independent Assessment at Year 30, by Jonah Platt

Excerpt

Methodology and Results

Each aspect of program efficacy was evaluated based on direct evidence (testimonials, surveys, participant descriptions, and program descriptions) across countries, regions, and years of available printed data. Of the 500,000 or more student impacts reflected in the printed reports, only specifically articulated mentions were included in the data sets. The numbers represent the number of mentions, expressed first numerically and next as percentages, rounded to the nearest 10, to reflect the relative impact of the programmatic element.

1. Habit-of-Heart Cultivation	31	10%
2. Social Cohesion and Conflict Resolution	35	11%
3. Students Teach Others as Altruistic Service	40	12%
4. Applied Academics or Arts as Service	39	12%
5. Broader Community Impact Described or Implied	53	17%
6. Problem Solving Extends to Global Wisdom Exchange	10	3%
7. Evolving Identity of Learner or Leader	44	14%
8. Before and After Impact (Perspective, Social or Learning Habits, Outcome)	67	21%

Assessor's Comments

...Reviewing the now organized datasheet, one may see countless qualitative stories of the high impact FCL has had on the lives of youth, educators, and their communities. Additionally, the programs connect classrooms from across the world, leading students to inspire, learn from, and feel connected with one another and with their global community.

In fact, connection and a holistic perspective of "one human family" seems to be at the center of the FCL curriculum ...

.... Throughout the reports, there are countless accounts of educators and community members reporting the tremendous impact and changes they've seen in their students, classrooms, and community. Indicators show students more engaged and committed to their schooling, and classroom culture seems to peak in the highest models of what it means to be altruistic. This modeling offered experiences that influenced many students to develop healthy mental models of the world and perhaps to understand their place in the world through self-actualized action and community support.

The most noticed components found in the students' holistic development is feeling connected with their community and full of hope.

Sample of Convictions-Based Research (Based on Table I)

Hypothesis:

Students who apply learning in service to society increase their long-term altruistic contributions toward positive change.

Data:

Early Full-Circle Learning academic studies showed surprising improvements in coeskills. Likert surveys showed enhanced motivation to learn, as well as improved social cohesion, awareness, and altruism. For the next twenty years, narrative reports were collected tracking impressions of individual and community impact.



Collaboration:

Educational leaders across international and cultural boundaries reported community impact and contributed ideas for local adaptation.

Adaptation:

Multidisciplinary strategies achieved their expected impacts in many cases and exceeded their expectations in others. For example, where global “wisdom exchanges” occurred among students who compared problem-solving approaches and solutions to a common dilemma, the students’ academic rankings doubled and community impact flourished. Thus, emphasis increased on the issue of human identity and seeing challenges as both local and global, part of the transformation process shared by all. (Pictured, a student of global climate change compared best practices in global land management, prepared to share results overseas.)

Conviction:

To the extent that students embrace their role as humanitarians and change agents and receive opportunities for impact, they can retain hope in almost any given area needing transformation.

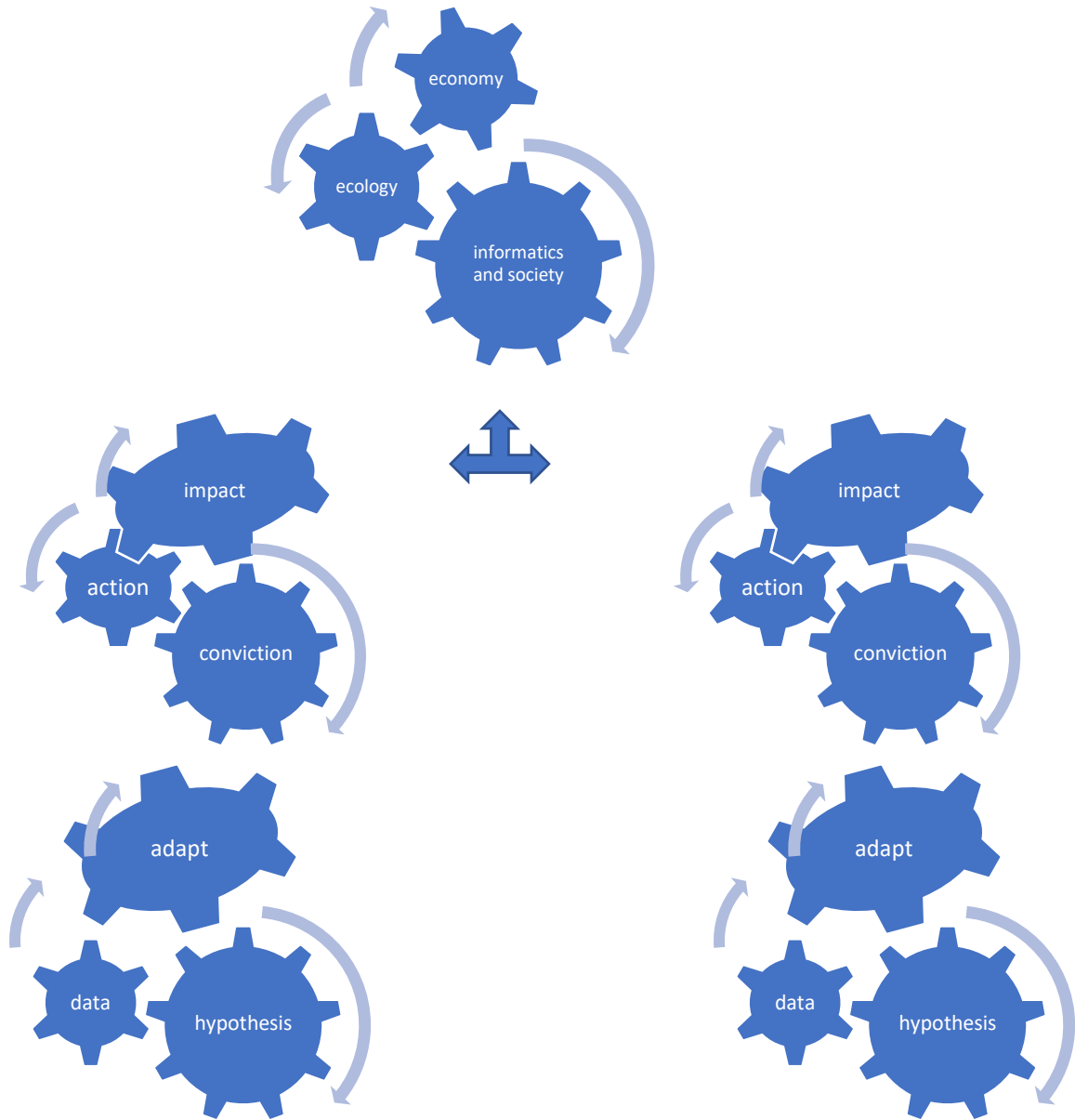
Action:

Geographically diverse projects employed a common instructional design, with local adaptations based on specific challenges. Projects addressed sustainable development goals such as climate, health, poverty, equity, conflict reduction, and eldercare. Learning institutions incorporated service-learning within transformative projects, heightening altruistic and academic development and encouraging social cohesion and quality of life in communities.

Impact:

Thirty years after the launch of the hypothesis, before-and-after narratives featured broad community impact in arenas other than Education (sister systems) as the most frequently mentioned signatories of change. Individual indicators of progress seemed almost as step stones leading toward that ultimate impact: a concomitant transformation of the learner, the learning community and the broader systems that make up a community.

Conviction-based Network of Systems
Powered by intersection of transdisciplinary gears



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