

McMurrich Play: Inventive Teaching Practices to Strengthen Formal Learning

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McMurrich's program of play across four modes, green, screen, machine, and everything in between, offers learning in non-traditional constructionist settings namely, outdoors, in the virtual or digital environment via collaboration on computers, in building or "making" spaces, and in any other contexts that encourage learning. McMurrich Junior Public School is a member of CPSN (Canadian Playful School Network).

The program's success can be described in terms of three hallmarks of productive settings: unstructured activities, out-of-classroom environments, and guiding, not leading, facilitation [1]. The use of unstructured, experimental experiences in instruction can encourage youthful projects and play, which in turn can increase a student's growth mindset, leading to a can-do attitude. Although beneficial, experimental or unstructured experiences are mainly reserved for informal settings only, such as museums, camps, or library settings. The challenge of offering these experiences ONLY in an informal context is ensuring that all students have access to the opportunities, as they can cost money, and require travel, time, memberships, and even awareness.

McMurrich Play exposes students to informal-like activities, environments, and facilitation within a school setting. The unique advantages presented in McMurrich Play's outdoor, digital, and "informal" learning environments are blended into school affording the benefits of a) capturing students' situational interests, b) encouraging student interest-driven and identity-driven learning, c) supporting the social construction of knowledge, capitalizing on the social nature of how humans learn, d) normalizing student talk, and e) providing opportunities to illuminate student thinking, argument, and reflection [1].

Specifically, McMurrich teachers identified the following advantages of blending informal designing, making, and playing into their formal school teaching:

- Students take active roles in their learning journey, being active participants in their learning experiences, and curators of their own learning.
- Students find many entry points
- Students learn to take risks with each other through cooperative/team-building activities and games
- Connects learning to the Global Goals
- Play is meaningful, actively engaging, and socially engaging. Involves Global Competencies like design thinking process and critical thinking.

For each of the four modes of McMurrich Play, we've described the classroom actions and pulled out the features of the learning activities, learning environment, and learning facilitation that supported "fun" learning. Finally, we identified the learning indicators present in each based on Petrich, Wilkinson, and Bevan's chapter, "It Looks like Fun, but Are They Learning?" [1]. We invite you to learn from our examples and to use the SEEK & FIND list on the last page to build activities across the four modes of play to inspire your students' learning.

Special thanks to the Canadian Playful Schools Network (CPSN) and to Dr. Katey Shirey and Advanced Learning Partnerships (ALP) for their support in writing this summary.

[1] Honey, M., & Kanter, D. (2013). *Design, make, play: growing the next generation of stem innovators*. Routledge.

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Green Play: What did they do?	<i>Activities</i>	<i>Environment</i>	<i>Facilitation</i>	<i>Learning Indicators</i>
<p>Immediate and easy connections to nature/life systems in the sciences when outdoors:</p> <ul style="list-style-type: none"> ● Observing the salmon migration ● Analyzing the three-sister garden, then using learning about companion plants to plan, seed, plant, and harvest a garden (two 5-month cycles). Investigating which tomato seeds had been to space based on germination and plant growth. [External partner: Indigenous partner] ● Observing butterfly lifecycle, creating an inviting habitat, releasing butterflies 	<p>A2. Materials and phenomena are evocative and invite inquiry</p> <p>A3. Tools and concepts of science are a means, not an end.</p> <p>A5. Activities and investigations encourage learners to complexity their thinking over time.</p>	<p>E1: past project examples and current activities are situated to seed ideas and inspiration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I3. Generating new ideas (innovation) [complexification]</p>
<p>Natural focus on mindfulness:</p> <ul style="list-style-type: none"> ● Having a quiet moment to read ● Guided mindfulness and meditation to explore physical (see/feel/hear), emotional, mental, and spiritual perspectives 	<p>A5. Activities and investigations encourage learners to complexity their thinking over time.</p>	<p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p>	<p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I1. Active engagement [noting duration and frequency of participation, work inspired by prior examples, expressions of joy, wonder, frustration, curiosity]</p> <p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p>
<p>Learning on the land:</p> <ul style="list-style-type: none"> ● Building structures as a team using loose parts ● Playground during a beach clean up day on Sunnyside Park- Lake Ontario to learn about invasive species and how they harm our water systems ● McMichael Art Gallery 	<p>A4. Multiple pathways are readily available</p>	<p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I3. Generating new ideas (innovation) [Repurposing ideas/tools]</p> <p>I4. Collaboration on ideas with other teams</p>

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<p>Drawing on local outdoor/community resources:</p> <ul style="list-style-type: none"> ● Island Public/Nature Science School Trip ● Etienne Brule Park for cooperative games, skills-building ● Humber River Valley Discovery Walks and The Shared Path ● Owl pellets with scientist Jennifer 	<p>A2. Materials and phenomena are evocative and invite inquiry</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I1. Active engagement [Wonder]</p>
<p>Connections to art outdoors:</p> <ul style="list-style-type: none"> ● Creating a play for others to watch ● Outdoor artwork inspired by Andy Goldsworthy, made from natural materials ● Exploring murals by Indigenous artist Philip Cote in Humber Park while learning about the pylons that support the subway at Old Mill ● Riverside read aloud (literature, setting informs audience interpretation?) ● Line drawings on nature walks 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p>	<p>E1: past project examples and current activities are situated to seed ideas and inspiration</p> <p>E2. The activity location's design enables cross-talk and invites collaboration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality</p> <p>I3. New ideas inspired by Goldsworthy, sharing new ideas</p>

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Screen Play: What did they do?	Activities	Environment	Facilitation	Learning Indicators
<p>Purposeful expression:</p> <ul style="list-style-type: none"> Building in Minecraft education, GWG girls learn to use the engineering design process to prototype sustainable and responsible worlds while growing connectedness and belonging. Challenge: How will you contribute to sustainability in a way that is personalized to your community? Your role? Your team approach in action? 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p> <p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [personalization of projects, evidence of self-direction]</p> <p>I3. Generating new ideas (innovation) [efficiencies gained through growing fluencies with concepts, tools]</p> <p>I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [sharing, helping others, contributing to the work of others]</p>
<p>Career & mentor connections:</p> <ul style="list-style-type: none"> Career awareness via Shoutcasters GWG Conferences, connections with women's partner network Museum Math Rocks and Minerals—Students collaborated with a Museum-based Mentor to create notes and photos for a Rocks and Minerals Museum in Minecraft 	<p>A2. Materials and phenomena are evocative and invite inquiry</p> <p>A4. Multiple pathways are readily available</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I1. Active engagement [noting duration and frequency of participation, work inspired by prior examples, expressions of joy, wonder, frustration, curiosity]</p>
<p>Art Applications:</p> <ul style="list-style-type: none"> Create art using mathematical patterns in Minecraft Exploring Cree flower symbols to create digital flower design for National Floral Design Day [External partner: Indigenous partner] Design and code a device to randomly select a color and create an artwork guided by the random colourizer based on "The Day the Crayons Quit" [Literature connection] 	<p>A2. Materials and phenomena are evocative and invite inquiry</p> <p>A3. Tools and concepts of science are a means, not an end.</p>	<p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p> <p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction],</p>

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<p>App Design:</p> <ul style="list-style-type: none"> • High-level app planning: wireframing and storyboarding practice in app design challenge • Students designed an app to support UN Sustainable Development Goal 12: Responsible Consumption and Production. For example, a points-based game app to give user-friendly information about sustainability, littering, and safe disposal Partners: TATA, goIT • Public App design Pitch and awards 	<p>A3. Tools and concepts of science are a means, not an end</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time</p>	<p>E1. Past project examples and current activities are situated to seed ideas and inspiration</p> <p>E2. The activity location's design enables cross-talk and invites collaboration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p> <p>I3. Generating new ideas (innovation) [repurposing ideas/tools, complexification]</p>
<p>Game Dev:</p> <ul style="list-style-type: none"> • High-level game planning: Focused workshop on design cycle, including inspiration, creative interpretation, intentional planning collaboration, feedback and iteration. [External mentor] • Esports challenge, OFSEA Cyber security design challenge McMurrich Owl Builders were a Provincial Finalist! Students built in Minecraft • Cooperative Games students used their Microbits to code games and output sound including the use of variables, arrays, and debugging strategies • Two-player racing game design in scratch programming. Student leaders stepping up and guiding peers • Code a "Shark Attack" arcade game using Microbits 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p> <p>A3. Tools and concepts of science are a means, not an end.</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time.</p>	<p>E2: Activity [station, location?] design enables cross-talk and invites collaboration</p> <p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [borrowing and adapting ideas, tools, approaches, sharing, helping others, contributing to the work of others].</p>

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Machine Play—Building and Making with Purpose: What did they do?	<i>Activities</i>	<i>Environment</i>	<i>Facilitation</i>	<i>Learning Indicators</i>
<p>External partners supporting making:</p> <ul style="list-style-type: none"> ● Solar race car engineering design challenge [external partner Relay Education] ● Student podcast series on local student concerns, i.e., water security and biodiversity [external partner: University of Toronto] ● “My superpower” keychain in 3D Tinkercad sketch and 3D printing [external partner Toronto Reference Centre-Innovation Centre] ● Caricature keychain for student-written comics about wildlife in the city [external partner Toronto Library] [Literature connection] 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p>	<p>E1: Past project examples and current activities are situated to seed ideas and inspiration</p> <p>E2. The activity location's design enables cross-talk and invites collaboration</p> <p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p>
<p>Complexifying familiar toys & actions:</p> <ul style="list-style-type: none"> ● Paper airplane launcher engineering design challenge ● Lego Spike design challenges ● Kaleidoscope design challenge with iterations ● Plant watering system design with pump and moisture sensor ● Rectangle Racerz - mathematically described wooden car chassis blueprinting and prototyping with grade 1 ● 3D gravity-driven Maze design and construction using mathematical relationships, piston pressures ● Rube Goldberg Machine - Innovating on gravity-driven marble runner designs for grade 1 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p> <p>A3. Tools and concepts of science are a means, not an end.</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time</p>	<p>E1. Past project examples and current activities are situated to seed ideas and inspiration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p> <p>I3. Generating new ideas (innovation) [repurposing ideas/tools, redirecting efforts, efficiencies gained through growing fluencies with concepts, tools, and phenomenon, complexification]</p>

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<p>Students as Teachers through Making:</p> <ul style="list-style-type: none"> • Makey Makey-integrated learning tools to teach grade 1 students about Canadian Space Technology exploration and advancements • LED paper lanterns for the first day of school to decorate and identify the classroom for families • User-centered well-being-minded fidget tool design with lights and sounds • Human Organ Systems interactives with Makey Makey and Scratch programming 	<p>A3. Tools and concepts of science are a means, not an end</p> <p>A4. Multiple pathways are readily available</p>	<p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p>	<p>I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [borrowing and adapting ideas, tools, approaches, sharing, helping others, contributing to the work of others]</p>
<p>Public Presentation Days!</p> <ul style="list-style-type: none"> • Making Day with Parent Guests - Art Bot team engineering design challenge - design the Bot and create collaborative art. • Making Day with Parent Guests - Paper button design with an emphasis on colour theory and terminology • McMurrich Business Day - sharing STEM-inspired products and services as student entrepreneurs i.e., Key2Dream mental health lantern and emoji stuffi design challenges; & Dessert treat iteration 	<p>A3. Tools and concepts of science are a means, not an end.</p> <p>A4. Multiple pathways are readily available</p>	<p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>"Students showing resilience" "Students go beyond being consumers" I1. Active engagement [noting duration and frequency of participation, work inspired by prior examples, expressions of joy, wonder, frustration, curiosity]</p> <p>I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [borrowing and adapting ideas, tools, approaches, sharing, helping others, contributing to the work of others]</p>

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Everything in Between—The Context in which Learning Happens: What did they do?	<i>Activities</i>	<i>Environment</i>	<i>Facilitation</i>	<i>Learning Indicators</i>
<p>Affirming the identity of self and others</p> <ul style="list-style-type: none"> ● Video PSAs - information to support others in getting support. ● Button club - Designing a button to express allyship ● Poetry Portraits - Using poetry and text to make a biographical text-embedded portrait image ● Personal Peace Paintings - Ink art paintings to represent personal feelings of peace, calm, and authentic self-expression [External partner] ● Affirmation Key Chains - Traditionally leather-stamped keychains to support well-being during McMurrich Business Day ● Calming water tube and necklaces demonstrate valuing the feelings of customers ● Cricut mindfulness mugs with student-designed mindfulness messages ● Motivational Poster design, feedback, and iteration allow students to embody leadership ● Student presenters sharing their stories of religious traditions and holidays 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p> <p>A4. Multiple pathways are readily available</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time</p>	<p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p> <p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p>
<p>Creative expressions through creating:</p> <ul style="list-style-type: none"> ● Remembrance Day assembly drama production ● Rock stories - Designing a rock to share their learning ● Baked apples - Students baked apple crisps for each other ● Printmaking - Lino block carving with iteration to create unique paper prints. [External partner: Indigenous partner] 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify</p>	<p>I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [borrowing and adapting ideas, tools, approaches, sharing, helping others, contributing to the work of others]</p>

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			their intentions through reflective conversations.	
<p>Literacy connections:</p> <ul style="list-style-type: none"> ● Circuit-integrated mini-book development to showcase making + literacy. ● Broken Crayon Art for Literacy connections - Students drew crayon art based on books ● Writers workshop with lots of guest speakers to introduce and share realistic fiction writing. 	<p>A2. Materials and phenomena are evocative and invite inquiry</p> <p>A3. Tools and concepts of science are a means, not an end</p> <p>A5. Activities and investigations encourage learners to complexify their thinking over time</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p> <p>E3. Studio/classroom/ location layout supports individual initiative and autonomy</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I3. Generating new ideas (innovation) [repurposing ideas/tools, redirecting efforts, efficiencies gained through growing fluencies with concepts, tools, and phenomenon, complexification]</p>
<p>Public/community co-creation and intentional community building:</p> <ul style="list-style-type: none"> ● The Bubble Project: An outdoor installation of student- and staff-painted circles attached to the school playground fencing ● Design and scale model a public space to bring art and people together outdoors ● Bowling! Connecting data management launch with community-building bowling ● Monthly Domino Rally Challenge to promote skill building and community 	<p>A1. Activities and investigations build on learners' prior interests and knowledge</p> <p>A3. Tools and concepts of science are a means, not an end</p>	<p>E2. The activity location's design enables cross-talk and invites collaboration</p> <p>E4. Activity adjacencies encourage the cross-pollination of ideas</p>	<p>F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]</p> <p>F2. Facilitators try to focus learners' attention based on individual paths of understanding</p> <p>F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations.</p>	<p>I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]</p> <p>I3. Generating new ideas (innovation) [repurposing ideas/tools, redirecting efforts, efficiencies gained through growing fluencies with concepts, tools, and phenomenon, complexification]</p>

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SEEK AND FIND: What “fun” learning can look like (adapted from Honey & Kanter, 2013)

ACTIVITIES:

- A1. Activities and investigations build on learners' prior interests and knowledge
- A2. Materials and phenomena are evocative and invite inquiry
- A3. Tools and concepts of science are a means, not an end
- A4. Multiple pathways are readily available
- A5. Activities and investigations encourage learners to complexify their thinking over time

ENVIRONMENT:

- E1. Past project examples and current activities are situated to seed ideas and inspiration
- E2. The activity location's design enables cross-talk and invites collaboration
- E3. Studio/classroom/location layout supports individual initiative and autonomy
- E4. Activity adjacencies encourage the cross-pollination of ideas

FACILITATION:

- F1. The facilitation is welcoming and intended to spark interest [welcome, give materials and one to two moves, point to the work of others]
- F2. Facilitators try to focus learners' attention based on individual paths of understanding
- F3. Facilitation should strengthen understanding by helping learners clarify their intentions through reflective conversations

Learning INDICATORS and Look-fors:

- I1. Active engagement [noting duration and frequency of participation, work inspired by prior examples, expressions of joy, wonder, frustration, curiosity]
- I2. Developing intentionality [variation of efforts and paths, personalization of projects, evidence of self-direction]
- I3. Generating new ideas (innovation) [repurposing ideas/tools, redirecting efforts, efficiencies gained through growing fluencies with concepts, tools, and phenomenon, complexification]
- I4. Building solidarity and shared commitment to a practice of design, experimentation, and tinkering [borrowing and adapting ideas, tools, approaches, sharing, helping others, contributing to the work of others]

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