THE WINNETKA PUBLIC SCHOOLS DISTRICT 36

A Community of Learners

Informational Memo: Northwestern FUSE Research Update

TO: School Board
Superintendent Kocanda

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Background

During the 2016-17 school year, Winnetka School District 36 adopted FUSE Studios, an interest-driven STEAM learning environment developed by researchers at Northwestern University. FUSE was incorporated into Mr. Selgrat's Innovative Technology class ("InnoTech") in the CoLab at Washburne.

Northwestern was invited to conduct research in Winnetka as part of a broader program of research on FUSE Studios led by Dr. Reed Stevens, Professor of Learning Sciences. As part of this partnership, doctoral student, Peter Meyerhoff, spent over 60 hours observing, interviewing and recording students as they worked in the CoLab as part of his doctoral research.

Research Objectives

1. Learners How does learning occur in a FUSE studio and in InnoTech more generally? What do students learn about programming, design, and the use of advanced creative tools? How do young people organize their activity when they have freedom and choice? How do new interests form, and how do existing interests grow and develop? What kinds of learning arrangements develop in innovative physical spaces like the ones in District 36 schools? How do kids want to learn, and do FUSE and InnoTech align with their interests and concerns?

2. Teachers, parents & administrators How does a school system itself "learn" to integrate new approaches like FUSE and InnoTech into existing educational practices? How do different organizational stakeholders—educators, parents, and district leaders—interpret, respond to, and enact such programs?

After discussing the research program with the leadership team in November 2016, Mr. Meyerhoff added an additional focus to explore ways to, as Dr. Kocanda expressed it, "clearly define evidence of learning" in the CoLab using methods other than quantitative measurement. Given that student development in InnoTech does not lend itself to representation through traditional metrics such as pre- and post-tests, what would constitute evidence of learning?

Research Methods

- Observed students in the CoLab during the 2016-17 and 2017-18 school years (over 120 hours).
- Recorded students as they worked in the CoLab.
- Interviewed school and district leaders before, during, and after the on-site observation.
- Held ongoing conversations with Mr. Selgrat throughout the process, both in extended interviews and casual conversations.
- Reviewed memoranda given to the Board regarding InnoTech, the CoLab, and FUSE.
- Researched the history of Winnetka's reforms of the 1920s and 1930s, reviewing archival material and studying two doctoral dissertations (Tewksbury, 1962; Schumacher, 1972) that cover this period in detail to provide a historical perspective.

Historical Context

The question of measuring achievement in the project-based, interest-driven environment of InnoTech has deep roots in the Winnetka's history. The Winnetka Plan in the 1920s and 1930s, designed and implemented by Carleton Washburne, had a strict separation between systematic, rigorous, individualized drill-based instruction in core academic subjects (what Washburne called the "common essentials") and "group and creative activities" (GCA). GCA covered a wide range of non-academic work, in particular hands-on, constructive work such as art and shop projects.

Washburne saw the goal of GCA as being "to help each child develop his own special interests and abilities, and to give him the opportunity to exercise originality, initiative, and leadership in various areas" (Tewksbury, 1962). He described GCA as

> *the vital, life-giving part of the curriculum. They are the real education. Giving children a mastery of the three R's is important but it is mere training. Education*

involves drawing out the child himself. It is for this purpose that the group and creative activities exist. (1932)

Similar to our situation a century later, Washburne saw the measurement of GCA as a challenge. According to Tewksbury (1962):

> *It disturbed him to have to rely on subjective judgment to evaluate the results of this part of the curriculum. His own background in science and the effort he and his staff put forth to construct a 'scientific curriculum' in the teaching of the common essentials made him quite conscious of the lack of objective means to measure the success of that part of the curriculum which was devoted to group and creative activities. He made several attempts to devise measurement techniques, but made little progress.*

Defining "Learning" in the CoLab

In seeking "evidence of learning," the researchers sought first to understand what was being defined as learning in InnoTech for school and district leaders. From their interviews, it was narrowed to four goals:

- 21st Century Skills
- Design Thinking
- New Digital Literacies
- Identity Development: Consequential Transitions & Learning Pathways

Activity Structure in the CoLab

Mr. Selgrat gave students significant freedom to choose their activities. They were free to decide which challenges to work on, to work for short or extended time periods, and to choose which if any of their colleagues to work with.

A few students worked independently, while the rest worked in groups. A common pattern was that students would work in parallel, each on their own project, while actively consulting with each other for help, advice, or feedback. The physical design of the room and the fact that each student had access to a mobile device (tablet or laptop) strongly facilitated this type of learning arrangement. Students moved fluidly between individual and joint work, and moved back and forth among different groups.

Learning Stories

Field notes, recorded video, and conversations with students as they worked were used to develop a series of "learning stories". These stories provided examples of the kinds of learning phenomena reflecting growth and development in 21st century skills, design thinking, technical skills, and personal identity.

Reflections Across These Cases

From the 120 hours of observations, 6 cases were chosen to illustrate (1) common phenomena that were found consistently across a range of students, as well as (2) uncommon phenomena that are documented here to show their exceptionality.

21st Century Skills

With regard to the learning for which district leaders sought to find evidence—21st century skills, design thinking, and new digital literacies—some general conclusions may be drawn from this data.

- Widespread evidence of adaptive learning, innovation & creativity, executive functioning, technology literacy, active listening, problem-solving, communication, coordination, negotiation & teamwork, leadership, assertive communication, interest, curiosity, initiative, adaptability, and perseverance.
- Occasional evidence of perspective-taking, empathy, career orientation, and artistic & cultural appreciation.
- Minimal evidence of a service orientation, responsibility, appreciation for diversity, and citizenship.

To the extent that the skills of reasoning, argumentation, interpretation, and critical thinking may be considered to be part of design and technical activities, these were also present in InnoTech.

We note that the relatively infrequent presence of more socially oriented goals—empathy, perspective-taking and service—may have been a function of the activities on offer in the CoLab.

Design Thinking

The process of testing ideas and refining them when they failed was the defining characteristic of work in the CoLab. To the extent that "design thinking" represents the natural human activity of problem-solving, particularly in a hands-on technical environment that allows construction of material objects, there was significant evidence of this in the CoLab. The "spirit" of the design thinking framework was very much in effect.

New Digital Literacies

The achievement of new digital literacies was clear, obvious, and pervasive. Students learned to use architectural and 3D design software, operated and maintained 3D printers, programmed robots, wired circuits, created e-textiles, and in general developed significant fluency on a broad range of digital and physical tools. We noted that multiple students distinguished between the use of creative technical tools and their knowledge of what they thought of as "technology"—managing and moving files, uploading from one platform to another, and so on. We documented significant achievement on both.

Identity Development
One case (Kira) Northwestern researchers referred to as a highlight of their observations. The student called InnoTech and FUSE a "dream come true" said that "it's unimaginable that I can do this kind of stuff, I never thought I'd be doing that," and later connected this work with the idea of becoming an entrepreneur. More common were cases in which InnoTech gave students a context to develop and extend an existing interest. Many students spoke of wanting to become an engineer, but also mentioned that this interest had also been developed at STEM camps, afterschool programs, and other enrichment activities.

Relationship to Traditional Academics
Researchers were struck by the contemporary relevance to their observations of an old debate at Washburne. Washburne believed strongly that "group and creative activities" should not be explicitly linked with academic instruction:

> *The purpose of the group and creative activities is never academic. There is no attempt to teach subject matter through these activities, although there is necessarily frequent correlation between the [GCA] and the individual work. Such correlation as exists, however, is incidental and unforced. (1929)*

The story of as student encountering the advanced physics principles in Kerbal Space Program (KSP) is an example of the "incidental and unforced" character of the intersections observed in the CoLab. However, the complexity of the concepts that the student engaged with represented an outlier. Far more common were applications of routine mathematical skills of measurement and scale, such as adding together two lengths of measuring tape or working out the dimensions of a Minecraft world.   Other students unwittingly encountered real-world, concrete applications of conceptual principles like integration.

Recommendations from Northwestern Researchers

- Continue to provide structured-choice, interest-based learning environments like InnoTech, in which students have the ability to decide what to work on and whom to work with
    - All students begin the trimester with a FUSE challenge before working on other CoLab options. By starting in FUSE, students have a set of tools, along with experience in challenges already known to engage students, before going in their own directions.

- Explore technology options that would respond to alternative grading proposals that would allow the facilitator to mark down evidence of the "soft skills" as they occur
    - Explore tools that would enable students to produce reflections and portfolios in ways that are more integrated with their natural work process and that use their preferred communication styles.
- In this regard, D36 might consider a free Chrome plug-in called Soapbox, which enables screen captures combined with video and audio recording, so that students can show the teacher their digital work while narrating a reflection.

Next Steps

- Share complete learning stories with the administrative team.
- Conduct a follow up meeting with Northwestern researchers to discuss their observations and recommendations.
- Implement the recommendations provided by Northwestern researchers.
- Work with STEAM facilitators to develop activities that call for empathy and identification with the needs of others