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A crafting pedagogy for “mattering” STEM

ABSTRACT

The aim of this paper is to explore the potential for a crafting pedagogy for “mattering” STEM. We take the position that student engagement in craft processes in STEM classes has the potential to emphasize, through the material manipulation of matter, that they *matter*. We draw on two cases of crafting activities with STEM students and reflect on the challenges and opportunities of integrating crafting pedagogy. Through the process of crafting, we observed that students develop a sense of agency towards STEM and engage in learning from within the activity itself – highlighting one of the key opportunities for integrating craft. One of the main challenges relates to knowledge production and students’ expectation. We further discuss how to address these pedagogical questions; why craft should be integrated, and how valuable STEM knowledge is created, experienced and communicated through crafting.

Keywords: STEM education; craft; teaching and learning, mattering; learner’s agency

INTRODUCTION

This paper seeks to contribute to session #15: Exploring the Pedagogical Potential of Crafts in Modern Education and discuss the challenges and opportunities of integrating crafting as a pedagogical method for STEM (Science, Technology, Engineering and Mathematics) education. From the outset, we take the position that student engagement in craft processes in STEM classes has the potential to emphasize, through the material manipulation of matter, that they *matter*.

A starting point for a crafting pedagogy in STEM classes is students’ own experiences. Today, for example, students navigate a world controlled by their phones, the pressures of their online presence, and the allure, and proliferation, of cheating in the knowledge-production process by mis-using generative AI tools. This can make their worlds feel fleeting, performative and pointless (Haidt, 2024; Anderson and Winthrop, 2025). Simultaneously, students often feel ungrounded and unmoored in the physical world. To address this, “mattering” is an important aspect of the proposed crafting pedagogy and pays attention to two aspects: (1) How the material matters and “acts back” during the crafting process offering resistance in a ‘practice of correspondence’, as the maker answers to the world (Ingold, 2013) and how this dynamic is important to acknowledge in pedagogical activities (Hofverberg, 2019).

(2) Additionally, as Prilleltensky (2019) argues, “mattering” is about students’ experiences of feeling valued and adding value. However, Prilleltensky contends that neoliberal economic and social policies have diminished the sense of mattering for millions of people. If students feel that they do not matter and believe there is no point in learning STEM because technology and AI are doing the work, STEM education is facing significant challenges.

STEM education has recently gained significant attention in Sweden and internationally due to a notable issue: declining student interest. Reports from various Swedish organizations indicate that interest in STEM decreases with age and that girls, in particular, show less interest and are less likely to pursue further studies in the field (Näringslivets Skolforum, 2024). Similar concerns are raised in the *Swedish Strategy for STEM* (Government Office of Sweden, 2025) and in the American report *STEM 2026 – A vision for Innovation in STEM Education* (U.S. Department of Education, 2016) both of which emphasize the importance of fostering interest in STEM. A key question, then, how can we better understand the possibilities and challenges of sparking students’ interest in STEM? This question has long been debated and research highlights at least three major challenges: (1) The lack of motivation – students who see STEM merely a set of facts, disconnected from everyday life, often show lack of interest (Davidsson, 2008; Davidsson & Granklint Enochson, 2021). (2). Reinforcement of stereotypes – STEM education can unintentionally reproduce norms related to gender, age and social class in STEM (Danielsson, Avraamidou & Gansalver, 2023; Trojer, 2002). (3). Pedagogical approach – students often learn *about* STEM, rather than developing a sense of agency. In response to these challenges, research advocates for student-centered education, as it often fosters curiosity for exploring STEM further (Friend & Mills 2021; Keune & Peppler 2019; Sultan, 2024). In line with this, we are proposing a crafting pedagogy for “mattering” STEM. Drawing on Ingold’s view of mattering material and Prilleltensky’s concept of mattering as both feeling valued and adding value, the aim of this paper is to explore the potential for a crafting pedagogy to re-engage students in meaningful STEM-learning.

THEORY AND METHOD

In the paper, we draw on Adamson’s (2013) definition of craft as a process of “making something well through hand skill” (p. xxiv). Additionally, in the crafting process the human-material interrelations are important aspects of the meaning that is made in the crafting activity, as defined by Ingold (2013, pp 31, 69-70) as a “practice of correspondence”. He argues that meaning and knowing unfold in sentient reciprocity between people and materials in real-time movement. Furthermore, he contends that we do not acquire knowledge by standing outside the world, but rather that we know because we are already of the world (p. 5). This is a key aspect of a crafting pedagogy: we do not learn about the world from a distance, we learn from within. This means that the crafting pedagogy begins with the activity itself and knowledge arises through the process of crafting.

To explore the potential for a crafting pedagogy for mattering STEM, we draw on two case studies involving crafting activities with STEM students and reflect on the challenges and opportunities of integrating such pedagogy. The first case study was conducted at Malmö university (MAU), where teacher candidates engaged in mathematics learning through two different workshops involving crafting – one on binary numbers and another about circles during Pi-Day. The second case study took place at Rochester Technology Institute (RIT), where mostly STEM students, as well as some art & design majors, participated in a General Education class as part of their curricular requirements, on persuasion, using stitching as a tool for communication.

This paper employs an autoethnography as a methodological approach. Autoethnography is defined as a “systematic study, analysis and narrative description of one’s own experience, interactions, culture and identity” (Tracy, 2020, p.120) and it “provides ways to live and see the world, and connects to

theories, scholarly concerns, and broader cultures” (p. 117). For us, this means that the results are based on our experiences of teaching and participating in the case studies, and that we draw on our own reflections regarding both the challenges and opportunities of integrating crafting pedagogy. The experiences from the two case studies at MAU and RIT were discussed and compared in Zoom meetings, where we focused on identifying similarities regarding both opportunities and challenges (Esaiasson *et al.* 2017). The shared experiences of similarities are presented under results and should be viewed as a starting point for identifying a crafting pedagogy relevant to STEM pedagogy.

RESULTS

Even though the two case studies were conducted in different contexts (Sweden and the U.S.) with different STEM groups of STEM students (teacher candidates at MAU and mostly STEM majors at RIT), we identified three shared experiences that are valuable to acknowledge when teaching a crafting pedagogy for mattering STEM:

1. Mattering the set-up
2. Mattering an open-ended activity
3. Mattering reflecting through embodied experiences

The first shared experience is the importance of *mattering the set-up*. To engage student, the initial framing of the activity is critical. As teachers we had to overcome student's previous – or negative preconceptions about crafting to make it meaningful. A common question was “Why should we craft?” and the activity was sometimes perceived as trivial or a waste of time. For instance, after the first class at RIT, a few students approached Mandell in a friendly manner, saying at first thought they were in the wrong classroom, because the craft exercises from day one were unexpected. One strategy to mattering the set-up was to begin with a crafting activity without explaining, thereby bypassing initial resistance. Another approach was to contextualize crafting historically, such as highlighting the connections between weaving and programming, to broaden students’ understanding of its relevance, and to cultivate student respect for craft processes.

The second shared experience emphasizes the need for the crafting activity be *open-ended*. Student needed the freedom to make choices – such selecting technique, colors, or design, which developed a sense of agency. When the outcome was predetermined, the activity failed (which was the case with the circle activity at MAU),

The third shared experience is the importance of *reflecting through the embodied experience*, which occurred after the crafting process. At this stage, many students expressed appreciation for the activity – either while gathering around the crafted items (in Malmö) or through the written reflections (at RIT) through a Sticky Note methodology for collecting feedback. What we found particularly interesting was the diversity in how students articulated their learning; some deeply appreciated the crafting experienced; others, while enjoying the activity, still questioned its relevance to STEM learning; and some expressed that they really gained new insight about both STEM and themselves. Through this process, we observed that crafting enabled students to develop a renewed sense of agency in a unique and meaningful way.

DISCUSSION

The biggest challenges in the case studies relates to knowledge production – specifically, to students’ expectations about how valuable STEM knowledge is created and communicated. This is not entirely surprising, as much of STEM education overemphasize outcome over processes, and often value correctness and efficiency over exploration, expression, and process. By introducing crafting as a

method for teaching and learning in STEM classrooms, we were able to engage all students – every student participated in the activities without any overt resistance - even if not all of them fully understood the purpose or perceived its value. Some of the students were able to express – through the material manipulation of matter – that they *matter* through written reflections collected mostly anonymously. These experiences suggest that there is potential for integrating craft into STEM education, but doing so requires careful consideration of how STEM knowledge is traditionally expected to be learned, produced and communicated.

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