MATHEMATICAL PLAY: ACROSS AGES, CONTEXT, AND CONTENT

JUEGO MATEMÁTICO: A TRAVÉS DE EDADES, CONTEXTO Y CONTENIDO

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In the proposed working group, we will build from the foundation of the past two years' working groups as well as our members' continuing collaborations with researchers outside of this group. Specifically, we propose three days of activity, each focused on different aspects of developing the body of mathematical play research. We have planned the three following foci: adapting existing mathematical tasks and curricula to increase opportunities for play (Day 1); the reverse, adapting voluntary play activity to support mathematical learning (Day 2); and developing synergistic dialogue with members of the EMIC research community through an intra-working-group discussion session (Day 3).

Keywords: Teaching tools and resources; Affect, emotion, beliefs and attitudes, Informal education

Understanding mathematical play at all ages is an important, yet under-investigated domain within mathematics education research (e.g., Holton et al., 2001; Wager & Parks, 2014). Over the past three years, members of this Mathematical Play working group have developed a community of colleagues focused on identifying and characterizing productive theoretical lenses and methodological approaches to investigate students' mathematical play. Central to this work has been the emergent characterization of mathematical play as (1) voluntary engagement in cycles of mathematical hypotheses with occurrences of failure (Authors), (2) often spontaneous and self-directed toward a player's emerging goals (e.g., Wager & Parks, 2014), and (3) supported or discouraged through physical or digital interactions (e.g., Authors; Sinclair & Guyevskey, 2018). In preparation for this year's working group proposal, our co-organizers have focused on situating our work based on the degree to which it might be characterized as pure play as well as the degree to which it can be characterized as structured mathematical instruction. This focus is consistent with what Wager and Parks (2014) discuss as two seemingly contrasting ideologies: groups advocating an increased focus on teacher-directed instruction and scholarship confirming that children learn best in play-based environments (p. 223). Wager and Parks (2014) also point to calls to identify practices that bridge the two ideologies, and this proposal is a direct response.

In order to address the existing theoretical divide between play and instruction, we will discuss and collaborate around theory and results from several projects that participating researchers might situate along the dimensions of play and instruction. These conversations will focus on how specific activities and instructional interventions might support shifts along those dimensions. That is, we will

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focus on two shifts: how might an education researcher who has traditionally situated their work around more traditional mathematical tasks alter their existing instructional approaches to afford greater opportunities for play? And the complement: how might educators shift their interactions with students in a play setting to better support meaningful mathematical development?

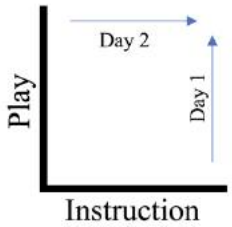

Figure 1: Graphic organization of two shifts we will explore – increasing the playfulness of high instructional tasks (Day 1) and increasing the instructional utility of high play tasks (Day 2)

Continuing the success of the last two years of the Mathematical Play PME-NA Working Group, we have developed the following overarching goals for this year's working group: (1) to engage participant researchers in conceptualizing the two shifts illustrated in Figure 1; (2) to share and discuss existing projects that are making or have made these shifts, specifically identifying frameworks and perspectives to support such shifts; and (3) to summarize these conversations and promote a synergistic dialogue with the EMIC working group.

Day 1 will center around examples of projects that originated as instructional activities but have shifted or are shifting toward more playful activities for students (Authors, Authors). Working group leaders will briefly introduce their projects and engage working group participants in tasks from their existing research projects. This will focus on identifying and discussing what play frameworks might be productive for supporting such transitions. The group will synthesize this discussion as a starting point to conceptualize how educators might incorporate playful activity within their existing instructional programs.

On Day 2, we will take a contrasting perspective as we explore design and facilitation practices that leverage mathematical play for learning. Leaders will engage group members in interactive play and board game activities with a focus on the mathematics that players draw on during their play. Leaders will then guide whole-group discussions to identify facilitation practices and pedagogical approaches to support meaningful learning in mathematical play.

On Day 3 the mathematical play working group will meet with the EMIC working group (Nathan et al., 2017) to explore areas of overlapping interest and potential convergence. Members of both groups will engage in intra-working-group conversations to highlight common theoretical and methodological approaches and identify opportunities for synergistic dialogue (i.e., mathematical play as an embodied way of learning, design considerations for embodied mathematical play, etc.).

References

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