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Rigorous and Flexible Illustrations: Inviting Realms of Possibilities

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Using data from my own research on the teaching and learning of undergraduate mathematics (e.g., abstract algebra, linear algebra, complex analysis), I will share the framework of inclusive materialism (de Freitas & Sinclair, 2014), which embraces intra-actions with others and materials such as images, models, and illustrations via gesture, fictive motion, symbols, and other embodied actions. This framework argues that mathematics is both material and ideational; that is, mathematical concepts come into being from materials and simultaneously inform materials—this is the process of assemblage.

There are four major tenets of this philosophy that support and challenge the need or desire to ensure that research illustrations reveal and do not mislead mathematical structure. First, by attending to mathematics as an assemblage of human and non-human bodies, inclusive materialism sets aesthetics and affect as the impetus of mathematical activity. For example, personal feelings can inspire a mathematical idea in one person and deter another person. Second, these material practices shape and are shaped by socio-political factors suggesting that, like all human endeavors, mathematical concepts are sociocultural immersed bodies. Third, by asking questions of embodiment for whom, this framework describes phenomena which privilege differences and emphasize the changing nature, or virtuality, of matter. In other words, mathematics comes to be known in unique ways because mathematical concepts are mobile and vibrant. Finally, this framework appreciates how surprise and creativity contribute to the assemblage of a mathematical concept, because meaning is created and negotiated by (re)configuring figures, bodily movement, attitudes, conversations, and speech, in non-deterministic ways. In summary, mathematics comes to be known through an entanglement of discourse between human and non-human phenomena consisting of physical and nonphysical aspects of a situation, including objects, motions, and context. Through intra-actions with materials, realms of possibilities regarding mathematical concepts begin to emerge through sensation, action, and perception.

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