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Long-term effects of sense making and anxiety in algebra.

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Summary: This chapter offers a framework for the long-term development of sense making and anxiety for mathematics in general and algebra in particular. While many may see the development of algebra building from the basic ideas of arithmetic and generalizing to algebraic techniques for formulating and solving problems, over the long-term increasingly subtle changes of meaning may give pleasure to some yet become problematic for others. The symbol “ -2 ” starts off as an operation “take away 2” but later represents the concept of a negative number, “minus 2.” The algebraic symbol “ $-x$ ” however only represents a negative number if x is positive, and takes on the new meaning as the “additive inverse” of x . While some students find algebra a source of pleasure and delight as it grows in sophistication, others find it problematic and seek to rote-learn techniques in ways that lack meaning in more sophisticated contexts. Here we consider how successive experiences that individuals encounter effect long-term learning. Sometimes experiences that are supportive in one context may become problematic, leading to negative emotional reactions. The chapter considers how various visual and symbolic approaches involve specific supportive and problematic aspects. Sometimes curriculum design that reduces the level of difficulty can give short-term success yet inhibit long-term sense making. On the other hand, by reflecting on profound underlying structures (“crystalline concepts”), mathematical ideas may be constructed and connected in ways that offer long-term flexibility.

Classification: C30 C20 H20 H30

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