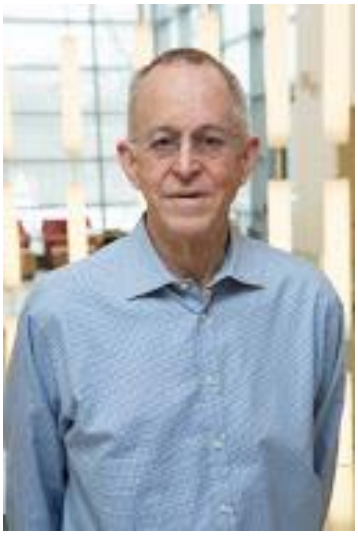
Excerpts from "The Growing Importance of Linear Algebra in Undergraduate Mathematics" by Alan Tucker

Linear algebra stands today as the epitome of accessible, yet powerful mathematical theory. Linear algebra has many appealing facets which radiate in different directions… A mastery of finite vector spaces, linear transformations, and their extensions to function spaces is essential for a practitioner or researcher in most areas of pure and applied mathematics. Linear algebra is the mathematics of our modern technological world of complex multivariable systems and computers.

… While mathematical methods – principally calculus-based analysis - were once largely restricted to the physical sciences, tools of linear algebra find use in almost all academic fields and throughout modern society. The interaction with modern computation is especially appealing: previously, theory was needed to give analytic answers since explicit computation was hopelessly tedious; nowadays, theory is used to guide increasingly complex computations…

There is an even more pervasive practical side of linear algebra. Stated in starkest terms, linear problems are solvable while nonlinear problems are not. Of course, some nonlinear problems with a small number of variables can be solved, but 99.99% of multivariable nonlinear problems can be solved only by recasting them as linear systems.

The theoretical status of linear algebra is as important as its applicability and its role in computation. Vector spaces and linear transformations are central themes of much of mathematics. The fact that differentiation is a linear operator lies at the heart of the power of calculus and differential equations.



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The College Mathematics Journal, Vol. 24, No. 1 (January 1993), pp. 3-9