Linear algebra stands as a key component used in cutting-edge fields like data science, artificial intelligence, robotics, and computer graphics. Despite its importance, teaching this subject presents challenges, particularly due to the lack of visualization tools. This paper highlights such issues and challenges by providing a comprehensive study of research papers published between 1993 and 2018. The authors’ aim is to draw attention to potential research areas for enhancing teaching and learning practices in this field (Singh G. et al. (2021)).

Linear algebra mainly involves the study of vector spaces and matrices. Matrices provide an important tool to manipulate vector spaces. These provide a fundamental aspect of linear algebra theory. Although linear algebra is considered as a complex subject by university students, it contrasts with previous mathematical studies for students. The course presents intricate and extensive concepts and is key to the study of artificial intelligence, machine learning, robotics, etc. The challenge of studying linear algebra is the lack of tool which provide a spatial representation of the mathematics. Such visualization tools are important for concept development in linear algebra.

In this paper, the authors did a comprehensive study of the literature to study if the papers provide evidence of visualization methods which provide clarification of important concepts in linear algebra. The authors summarized over fifteen research papers to analyze the issues and challenges along with recommendations in the teaching of linear algebra. These findings are clearly tabulated for the ease of reading. Curriculum study groups provided specific recommendations to advise the mathematics departments for making usage of linear algebra using specific software that do not require any programming skills. Alternate approaches are suggested for learning linear algebra with computational and visualization simulations to build key concepts such as linear dependence, vector spaces, eigenvalues and vectors, and other basic concepts. Curriculum changes are suggested which provide cognitive skills to improve concept development. The authors have recommended visualization software such as CAS Maple and geometric software which can facilitate learning. The authors strongly believe that the usage of software as such can provide key understanding of the concepts of linear algebra.

Reference

Singh, G., Tuli, N., Issues and Mantri, A. (2021), *Issues and challenges in learning foundation linear algebra course with technology: a literature review*, 2021 International Conference on Advanced Computing and Innovative Technologies in Engineering.