COMMENTARY

Eye Tracking Technology: A Potentially Potent Tool for Education Research

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"You can close your eyes to reality but not to memories."
-Stanislaw Jerzy Lec

FOR HUMAN beings, the eye is the most vital tool for observing the world and obtaining information from the environment. At the same time, it is constantly revealing the mental state and activity of the individual via the direction, duration, and trajectory of its gaze, as well as its saccade frequency and the contraction and dilation of its pupil. Eye-tracking technology is to collect eye movement data using sensor technology and computer image processing (Sun et al., 2018). Typically, the eye tracker records eye movements and identifies gaze points by projecting an infrared or near-infrared light to the eye (Da Silva Soares et al., 2023). Early eye-tracking equipment was bulky and costly; nevertheless, with the advancement of technology, today's eye-tracking devices have become more portable, cost-effective, precise, and as a result, increasingly popular in various fields, particularly in science research.

Since more than a century ago, the eye-tracking system has been used to acquire eye movement data, and researchers have tried to employ such data to expand our knowledge of human behavior (Delabarre, 1898). Today, eye trackers are being applied to diverse research scenarios (Punde et al., 2017): In psychological studies, they are used to investigate emotional reaction and visual behavior of the subjects in social and interpersonal interactions; in market research, eye tracking helps measure consumers' attention points and fixation durations on advertisements, enabling advertisers to optimize ad design and effectiveness; in medical research, eye tracking is applied to visual rehabilitation, assisting patients in recovering visual capacities.

In educational research, the portability of eye-tracking devices enables the experiments to be conducted in more natural educational settings (Da Silva Soares et al., 2023), making eye tracking a highly favored technology among researchers, who not only use it to collect experimental data for teaching improvement but also leverage it to develop new

educational technology tools. For instance, according to Sun et al.'s study (2018), eye-tracking technology can assist with mathematics education by helping teachers to improve lesson plans and students to adjust learning methods. Zhang et al. (2020) developed a digital reading system based on eye-tracking technology, which provides users with more desirable mobile learning experience. Donmez's study (2023) finds that eye tracking can be applied in special education, aiding teachers in understanding how students with special educational needs perceive and process information, and facilitating their development of tailored teaching schemes.

In the field of science education research, endeavors have been made to utilize eye tracking technology to more specifically and precisely demonstrate students' learning processes and problem-solving strategies. *Eye-Tracking Technology in Science Education: A Systematic Review* in this issue is a survey of 103 studies published between 2014 and 2025 of the use of eye-tracking technology in science education research, encapsulating research areas and topics, devices used, participant demographics, interpretations of eye-movement indicators, and data processing methods entailed in the studies included (Guan et al., 2025). As an inclusion criterion, this review only includes relevant studies conducted in experimental settings, which may compromise its findings' representativeness of the overall applications of eye tracking in science education research. Despite the limitation, the article provides a snapshot of the current state and trends in this research area and offers new perspectives on science education research.

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