

## Eye Movements of Pre-Service Science Teachers During an AI-Supported Experiment Design Process

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### Abstract:

The aim of this study is to examine the experiment design processes of pre-service science teachers receiving artificial intelligence (AI) support, their eye movements throughout this process, and their views on AI-supported experiment design. Accordingly, how pre-service teachers use AI tools such as ChatGPT, their visual attention distributions, and their individual characteristics related to AI were investigated through a holistic approach to contribute to a multidimensional understanding of cognitive processes in AI-supported learning environments. This mixed-methods study was conducted with 32 pre-service science teachers studying at a state university in İzmir, Türkiye. Research data were collected using a Tobii Eye Tracker 5 device, screen recordings, a macro-based experiment design software, participants' AI interaction texts, and a fully structured interview form. Eye-tracking data were transformed into quantitative metrics such as fixation count, fixation duration, and saccadic time using Python-based analyses, while quantitative and qualitative data were analyzed using SPSS and MAXQDA, respectively. The implementation involved two stages: an initial manual experiment design process based on participants' prior knowledge and a subsequent AI-supported revision process. The findings revealed that visual attention distributions differed according to the components of experiment design. While individual cognitive processes were more dominant at certain stages, AI-supported content became more prominent at others. These findings suggest that AI does not replace cognitive processes but supports the redistribution of cognitive load by restructuring visual attention patterns. Therefore, systematic and continuous integration of AI-supported applications into teacher education programs is recommended.

### Keywords:

Artificial intelligence, experiment design, eye tracking, pre-service science teachers, visual attention.