

## **Techniques for Capturing Critical Thinking in the Creation and Composition of Advanced Mathematical Knowledge**

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It is widely accepted that mathematicians' working practices are difficult to study directly. This paper proposes four techniques for capturing mathematicians' critical thinking whilst creating or writing up advanced mathematics: plan writing, concept mapping, activity transcripts, and annotated drafts and transcripts. The role of critical thinking in science and mathematics is explored. The use of existing data capturing techniques in the context of advanced mathematics is critiqued. The relationship between mathematical creativity and the writing process is examined. The proposed techniques are presented through examples from the author's doctoral mathematics research. The utility of the proposed techniques is evaluated, with activity transcripts particularly promoted. Finally, the social context of these techniques is discussed with reference to the development of a mathematical process writing corpus.

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