

***STUDENTS' DIFFICULTIES IN SOLVING CONIC SECTION EQUATIONS
PROBLEMS BASED ON SELF-EXPLANATION THROUGH A
PHENOMENOGRAPHIC APPROACH***

Lulu Hasna Nur Afifah
Student ID: 1222050078

ABSTRACT

This study was motivated by the fact that many students still experience difficulties in solving problems related to conic section equations, both in terms of conceptual understanding and problem-solving procedures. This study aimed to describe the variations in students' conceptual difficulties, variations in procedural difficulties, and the factors causing students' difficulties in solving problems related to conic section equations. The study employed a qualitative phenomenographic approach, with self-explanation used as a diagnostic instrument to reveal students' difficulties. A total of 105 students were given Student Worksheets (LKM) and quizzes accompanied by self-explanations for analysis, 18 of whom were selected through maximum variation sampling for in-depth interviews to enrich the phenomenographic data. Data were analyzed through seven phenomenographic stages: familiarization, condensation, comparison, grouping, articulation, labeling, and construction of the outcome space, with data validity maintained through member checking and triangulation. The results showed that students' difficulties can be described in five hierarchical levels of the outcome space: rote reproduction without meaningful understanding, confusion in distinguishing similar concepts and representations, procedural fluency without conceptual grounding, contextual understanding that had not yet been transferred to new problems, and relational understanding that developed through the process and supported flexible strategies. The factors causing difficulties at each level varied, ranging from structural-institutional, affective-situational, social support/scaffolding, and metacognitive factors to independent exploratory strategies. These findings reinforce and enrich previous research on students' difficulties in solving mathematical problems in the topic of analytic geometry.

Keywords: *self-explanation, phenomenography, difficulties in solving mathematical problems, outcome space, conic section equations*

**ANALISIS KESULITAN MAHASISWA DALAM MENYELESAIKAN
MASALAH PERSAMAAN IRISAN KERUCUT BERDASARKAN
SELF-EXPLANATION MELALUI PENDEKATAN FENOMENOGRAFI**

Lulu Hasna Nur Afifah
NIM: 1222050078

ABSTRAK

Penelitian ini dilatarbelakangi oleh masih banyaknya mahasiswa yang mengalami kesulitan dalam menyelesaikan masalah terkait persamaan irisan kerucut, baik dari sisi pemahaman konsep maupun prosedur penyelesaian. Penelitian ini bertujuan untuk mendeskripsikan variasi kesulitan konseptual, variasi kesulitan prosedural, serta faktor-faktor penyebab kesulitan mahasiswa dalam menyelesaikan masalah persamaan irisan kerucut. Penelitian menggunakan pendekatan kualitatif fenomenografi dengan *self-explanation* sebagai instrumen diagnostik untuk mengungkap kesulitan mahasiswa. 105 mahasiswa diberikan Lembar Kerja Mahasiswa (LKM) dan kuis disertai *self-explanation* untuk dianalisis, 18 di antaranya dipilih melalui *maximum variation sampling* untuk diwawancarai secara mendalam guna memperkaya data fenomenografis. Analisis data dilakukan melalui tujuh tahap fenomenografi (familiarisasi, kondensasi, perbandingan, pengelompokan, artikulasi, pelabelan, dan penyusunan *outcome space*), dengan keabsahan data dijaga melalui *member checking* dan triangulasi. Hasil penelitian menunjukkan bahwa kesulitan mahasiswa dapat digambarkan dalam lima tingkatan *outcome space hierarkis*, yaitu: reproduksi hafalan tanpa pemahaman makna, kebingungan membedakan konsep dan representasi yang serupa, kelancaran prosedural tanpa pijakan konseptual, pemahaman kontekstual yang belum tertransfer ke soal baru, hingga pemahaman relasional yang berkembang melalui proses dan menopang strategi fleksibel. Faktor penyebab kesulitan pada tiap tingkatan bervariasi, mulai dari faktor struktural-institusional, afektif-situasional, dukungan sosial/skafolding, metakognitif, hingga strategi eksplorasi mandiri. Temuan ini memperkuat sekaligus memperkaya kajian sebelumnya mengenai kesulitan menyelesaikan masalah matematis mahasiswa dalam topik geometri analitik.

Kata kunci: *self-explanation, fenomenografi, kesulitan menyelesaikan masalah matematis, outcome space, persamaan irisan kerucut*