PRESERVICE SECONDARY MATHEMATICS TEACHERS' SOLUTIONS TO AN OPEN-ENDED PROBLEM

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Problem-solving (PS) promotes higher order thinking skills, mathematical sense, ability to reason and to communicate mathematically. Moreover, PS enables to increase knowledge and stimulate mathematics learning (Cai & Lester, 2010). The relevance of this topic is also evidenced by the extensive research carried out (e.g., Liljedahl & Santos-Trigo, 2019). Studies on open-ended problems, those which can be solved in diverse ways and allow infinite solutions, show these tasks help improve mathematical understanding, argumentative, and decision making and problem-solving skills (Chan & Clarke, 2017). As activities that contribute to mathematical development, they must belong to future teachers training programs. In this context, we developed an open-ended PS activity with 16 prospective secondary mathematics teachers (PSMT). They had to find lines that intersect a given parabola at two points. The objective of the presented research is to analyse the PSMT's solution, identifying the strategy used, the kind of solutions PSMT look for and the types of representations they use.

Results show two main strategies used: search particular lines and search general conditions for all lines fulfilling the requirement. Most find particular lines and two approaches stand out: lines through two points on the parabola and parallel lines above the vertex. Focus on mathematical representations, those using graphic representation of the parabola are slightly higher than those who only use algebraic representation. Most used graphic representation to search particular lines and highlight that many of them make the same mistake with the vertex placing, presuming that it is on the ordinate axis. Among those trying to find general conditions, the use of algebraic representation predominates. None had a correct solution and most abandoned the process to give particular lines satisfying conditions found up to that moment.

Results suggest that PSMT have difficulties to find a general expression for the lines and they prefer to study particular cases. We continue analysing more characteristics of the PS process.

References

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