

**DEVELOPMENT OF PROBLEM BASED LEARNING DEVICES
TO IMPROVE STUDENTS' MATHEMATICAL REASONING ABILITY
AT GRADE XI SMAN 2 BALIGE
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ABSTRACT

Development research aims: (1) To find out valid, practical and effective learning tools for students' mathematical reasoning abilities (2) To find out the improvement of students' mathematical reasoning abilities with devices developed with a problem-based approach. The stages of this study adapted Thiagarajan's 4-D model instructional development research model, namely define, design develop and disseminate. The trial design in this study used one group posttest and posttest design. The subject of this study in the readability and field trials was class XI students. Data was collected using 4 types of instruments, namely validity sheets, observation sheets, questionnaires and tests. The results of the study obtained a learning device that is valid, practical and effective. (1) Validity is shown from the results of 3 validators, average validity for: RPP 4.08, LAS 3.98. Valid learning outcomes test, the results of this validation indicate that the device developed is feasible (meets criteria $3 \leq V_a \leq 5$). (2) Practicality seen from the readability test with the results: 3.28 ranking implementation observation sheet, student response and teacher response to the learning device 3.06 and 3.27 respectively, this readability test results show that the device developed is practical (meet practicality criteria) (3) Effectiveness seen from field trials namely classical learning completeness $\leq 85\%$, the ability of teachers to use learning devices in good categories (3.50 - 4.49), and student activities are on the limits of learning effectiveness criteria. The field try increased the students' mathematical reasoning ability, after learning by using learning tools with problem-based approaches Overall, the results of the study showed that the learning devices developed were feasible to use

Keywords: Development of Learning Tools, Problem-Based Approaches, Mathematical Reasoning Ability

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