ABSTRACT

Development of Mathematics Problem PISA Type for Measuring Problem Solving and Mathematical Representation Capabilities of Junior High School Students

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Based on several times participation in the PISA survey, it is known that the ability of Indonesian students' mathematical literacy is very low. On the other hand, from the research obtained that information to the students of West Sumatra in particular, students' mathematical literacy skills including problem-solving ability and a mathematical representation also tend to be low. One of the factor is students not familiar in solving problems with such characteristics PISA questions which substantially contextual, demanding reasoning, argumentation and creativity to solve it. This research aims to produce maths types PISA to measure the ability of problem solving and mathematical representation of junior high school students.

The type of this research is design research with development study type using Plomp s development model that has three stages. In the preliminary stages of research analyzed the students characteristic, analyzed the curriculum and review of the literature. At the prototyping stages, designed the problem and formative evaluation to obtain valid questions, practical and effective. At the assessment stages carried out the assessment and described the ability of students to work on math problems PISA generated type. Data collected through observation, documentation, questionnaires, interviews, and tests. The data were analyzed descriptively.

The results were obtained 10 valid questions qualitatively in terms of content, constructs and language by rating validator and valid quantitatively and reliable analysis results items. Problems are practical with the characteristics that is easy to use. Problems are effectively satisfy the criteria of positive reactions among users, namely students and teachers. Students are motivated to do the questions, the problem broaden the teachers and students to the local culture, and teachers to acquire knowledge related development principles about PISA types and are keen to develop similar problems. The results of testing at three schools with different abilities indicate that the problem solving and mathematical representation of junior high school which has high ability students were in either category. While students of junior high school which has medium and low ability students are within the category enough. As for the average student's ability to solve problems on the dimensions of the content and context that are in the category of good and sufficient. However, most students are not able to give a reason in answering any questions well, structured and clearly.

ABSTRAK

Pengembangan Soal-Soal Matematika Tipe PISA untuk Mengukur Kemampuan Pemecahan Masalah dan Representasi Matematis Siswa SMP

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Dari beberapa kali keikutsertaan pada survey PISA, diketahui bahwa kemampuan literasi matematis siswa Indonesia sangat rendah. Di sisi lain, dari hasil penelitian diperoleh informasi bahwa untuk siswa Sumatera Barat pada khususnya, kemampuan literasi matematis siswa termasuk kemampuan pemecahan masalah dan representasi matematis juga cenderung rendah. Salah satu faktor penyebabnya yaitu umumnya siswa kurang terlatih dalam menyelesaikan soal-soal dengan karakteristik seperti soal-soal PISA yang substansinya kontekstual, menuntut penalaran, argumentasi dan kreativitas dalam menyelesaikannya. Maka penelitian ini bertujuan menghasilkan soal-soal matematika tipe PISA untuk mengukur kemampuan pemecahan masalah dan representasi matematis siswa SMP.

Jenis penelitian ini yaitu *design research* tipe *development study* menggunakan model pengembangan Plomp yang memiliki tiga tahap. Pada tahap *preliminary research* dilakukan analisis karakteristik siswa, analisis kurikulum, dan tinjauan literatur. Pada tahap *prototyping* dilakukan perancangan soal-soal dan evaluasi formatif untuk memperoleh soal-soal yang valid, praktis dan efektif. Pada tahap *asessment* dilakukan penilaian serta didekripsikan kemampuan siswa dalam mengerjakan soal-soal matematika tipe PISA yang dihasilkan. Pengumpulan data dilakukan melalui observasi, dokumentasi, angket, wawancara, dan tes. Data yang terkumpul dianalisis secara deskriptif.

Dari hasil penelitian diperoleh 10 soal yang valid secara kualitatif dari segi konten, konstruk dan bahasa menurut penilaian validator serta valid secara kuantitatif dan reliabel dari hasil analisis butir soal. Soal-soal tersebut memenuhi criteria praktis dengan karakteristik mudah digunakan. Soal-soal memenuhi kriteria efektif yang dilihat dari reaksi positif pengguna yaitu siswa dan guru. Siswa termotivasi untuk mengerjakan soal-soal, penyajian soal menambah wawasan guru dan siswa terhadap budaya daerah, dan guru memperoleh pengetahuan terkait prinsip-prinsip pengembangan soal tipe PISA serta tertarik untuk mengembangkan soal yang sejenis. Hasil uji coba di tiga sekolah dengan kemampuan berbeda menunjukkan bahwa kemampuan pemecahan masalah dan representasi matematis siswa SMP berkemampuan tinggi berada dalam kategori baik serta SMP berkemampuan sedang dan rendah berada dalam kategori cukup. Adapun rata-rata kemampuan siswa dalam menyelesaikan masalah pada dimensi konten dan konteks berada pada kategori baik dan cukup. Namun sebagian besar siswa tidak mampu untuk memberi alasan dalam menjawab setiap pertanyaan dengan jelas, baik dan terstruktur.