

Student Worksheets with *Problem Based Learning* (PBL) Model on Social Arithmetic Materials in Class VII SMP/MTs**Zakia Tussholeha, Sri Rezeki, Suripah***

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ABSTRACT

This research is development research that aims to produce learning tools with *Problem Based Learning* (PBL) model. Learning tools were developed in the form of Student Worksheets (LKPD). The mathematical material used in this study is social arithmetic material. This study uses an R & D development method with a 4-D model which has several stages, namely (1) *Define*, (2) *Design*, (3) *Develop*, (3) *Disseminate*. The instrument for collecting research data was in the form of a student worksheet validation sheet which was validated by 2 lecturers of Mathematics Education FKIP UIR and 2 teachers of mathematics studies at SMPN 1 Siak Kecil and student response questionnaire sheets. The data collection technique used is the validity test of the student worksheets and the practicality test of the student worksheets. The analysis technique used is the validity technique and the practicality technique. From the results of the study, the results of the validation of the student worksheets were 92.44% with a very valid validation level. And the results of the practicality of student worksheets are 87.84% with a very practical level of practicality. Based on the results of this study, it can be concluded that the development of Student Worksheets with the *Problem Based Learning* (PBL) model on social arithmetic material in class VII SMP/MTs is very valid, very practical, and suitable for use in the learning process

Keywords: *problem-based learning, social arithmetic, student worksheets.***ABSTRAK**

Penelitian ini merupakan penelitian pengembangan yang bertujuan untuk menghasilkan perangkat pembelajaran dengan model *Problem Based Learning* (PBL) yang valid dan praktis. Perangkat pembelajaran yang dikembangkan berupa Lembar Kerja Peserta Didik (LKPD). Materi matematika yang digunakan pada penelitian ini adalah materi aritmatika sosial. Penelitian ini menggunakan metode pengembangan R & D dengan model 4-D yang memiliki beberapa tahapan yaitu (1) *Define* (Pendefinisian), (2) *Design* (perencanaan), (3) *Develop* (pengembangan), (3) *Disseminate* (penyebaran). Instrumen Pengumpulan data penelitian berupa lembar validasi lembar kerja peserta didik yang divalidasi oleh 2 dosen Pendidikan Matematika FKIP UIR dan 2 guru bidang studi matematika di SMPN 1 Siak Kecil dan lembar angket respon peserta didik. Teknik pengumpulan data yang digunakan adalah uji validitas lembar kerja peserta didik dan uji praktikalitas lembar kerja peserta didik. Teknik analisis yang digunakan adalah teknik kevalidan dan teknik praktikalitas. Dari hasil penelitian diperoleh hasil validasi lembar kerja peserta didik 92,44% dengan tingkat validasi sangat valid. Dan hasil kepraktisan lembar kerja peserta didik 87,84% dengan tingkat kepraktisan sangat praktis. Berdasarkan hasil penelitian tersebut dapat disimpulkan bahwa pengembangan Lembar Kerja Peserta Didik dengan model *Problem Based Learning* (PBL) pada materi aritmatika sosial di kelas VII SMP/MTs sangat valid, sangat praktis dan layak digunakan dalam proses pembelajaran.

Kata kunci: *aritmatika sosial, lembar kerja peserta didik, problem based learning.*Received : September 27, 2022 /Revised : May 23, 2023
/Accepted : May 23, 2023 /Published : May 30, 2023**Introduction**

Education is the main foundation that must be seriously improved and designed to tread progress in the development of the nation. Besides that, one of the things that must be designed structurally in education is the curriculum. The national education curriculum that underlies the development of technology and the formation of a strong and advanced educational foundation is a reflection of the success of the learning process (Marsigit et al., 2018). The state is very dependent on the resources in it which can measure how far the progress of the nation is. The progress of a nation depends on the existing human resources in the country (Mulyana, 2020).

Education today is not only meeting the curriculum targets alone but also demands an understanding of students. One of the subjects that require students' understanding is mathematics. Mathematics plays a role in the process of everyday life, from small things to the development of sophisticated technology (Irwanti & Zetriuslita, 2021). Given the importance of teaching mathematics, teachers must be able to train students in learning mathematics so that learning objectives at school can be achieved (Suripah, 2015).

The problem that is still faced by teachers in learning activities is determining the right teaching materials to help students achieve the competencies that have been set in the curriculum. Learning must be able to involve students so that they can think actively and creatively (Suripah & Retnawati, 2019). The existence of teaching materials in teaching and learning activities is needed to support these activities. Teaching materials are one component that plays an important role in the learning process to assist students in achieving learning objectives.

Teaching materials are an important resource to support the learning process. The existence of teaching materials becomes a facilitator between teachers and students. The teacher is not the only source of learning, but currently plays more of a role as a facilitator. The use of teaching materials can bridge the problems and limitations of the absorption of students and the ability of teachers to manage to learn in the classroom. To stimulate learning activities, it is necessary to develop teaching materials that make students not dependent on teachers and can learn independently in the learning process (Alzaber et al., 2021). Teaching material that can be used by teachers to facilitate students in the learning process is LKPD. LKPD is a learning resource that can be developed by teachers as facilitators in learning activities for students. Another definition says that, LKPD is a teaching material which contains many assignments and exercises (Purwitaningrum & Prahmana, 2021; Sembiring & Napitupulu, 2022). While so far in schools that have become the object of research, there still have not used a lot of homemade teaching materials from subject teachers.

Based on the observations and results of interviews by researchers with mathematics teachers at SMP Negeri 1 Siak Kecil, it is known that teachers only use textbooks donated by the education office. The book does not meet the needs of students and is not by following the characteristics of students. Usually, in the teaching and learning process the teacher only directs students to record the material by reading the package book that is distributed then explains the material discussed that day and at the end of the lesson the teacher gives the task at the end of the package book, usually, students who are given assignments like this are lazy to do it because you are bored with this situation. Based on the results of these observations and interviews, the researcher took the initiative to develop student worksheets.

Teachers are expected to choose a learning model that is able to arouse the enthusiasm of students to be actively involved in the learning process (Rusman, 2018). In addition, the learning model used is also expected to facilitate students increasing interest in learning. One of the learning models that challenge students to learn how to learn, work in groups to find solutions to problems, and increase students' curiosity in learning is the *Problem Based Learning* model (Fadly, 2012; Noviantii, Yuanita, & Maimunah, 2020; Novilanti, Susanti, & Suripah, 2021). The application of this learning model requires students to have skills to solve problems so that students can learn knowledge related to these problems and can relate them to everyday life (Muflihatusubriyah, Utomo, & Saputra, 2021; Widyanti, Zetriuslita, Suripah, & Qudsi, 2021). One of the mathematics materials that can be taught using the PBL model is social arithmetic. Social arithmetic is found in many concrete forms in the daily lives of

students. Through learning with the PBL model, students will be invited to find concepts related to social arithmetic and students can apply knowledge about social arithmetic in everyday life (Sujarwo, 2020).

Based on the problems above, researchers are interested in developing Student Worksheets (LKPD) using the Problem Based Learning (PBL) model on social arithmetic material. The subject of the research is seventh-grade junior high school students. The resulting product is expected to support learning activities and facilitate students to solve daily problems related to social arithmetic material. Therefore, this study aims to produce learning tools with a valid and practical Problem Based Learning (PBL) model. Based on several previous studies, PBL has not been widely used by teachers, especially in the schools studied, therefore researchers consider it necessary to develop this student's worksheet with the aim of assisting teachers in conducting learning.

Research Methods

The form of research carried out is development research or known as *Research and Development (R&D)*. The development that will be carried out is the development of the 2013 Curriculum Student Worksheet (LKPD) on social arithmetic material using the *Problem Based Learning (PBL)* model and then testing the validity and practicality of the product. According to Thiagarajan (Trianto, 2014). The development model used is a 4-D model consisting of 4 stages of development, namely *Define, Design, Develop, and Disseminate*. The 4-D development model is presented in Figure 1.

The *define* stage is the stage to define and define the development requirements. (Trianto, 2014) suggests that there are five activities carried out in the *definition*, namely front-end analysis, student analysis, task analysis, concept analysis, and formulation of learning objectives. This stage is often called a needs *analysis*. The *Design* aims to design learning tools. In the design stage, researchers have made an initial product (*prototype*) or product design. According to (Endang, 2014) this stage is carried out in three steps, namely: (1) media selection, (2) format selection, and (3) initial design.

The *development* aims to produce a revised Student Worksheet (LKPD) based on input. This stage includes two development steps, namely: expert validation (*expert appraisal*) and development testing (*development testing*). While *dissemination* is the stage of using LKPD that has been developed on a wider scale, for example in other classes, in other schools, and by other teachers.

The data collection instruments in this study were validity instruments and practical instruments. The instrument of validity in this study was in the form of a validation sheet that was used to validate the LKPD that was filled out or assessed by the validator. Meanwhile, the practicality instrument in this study was in the form of a student response questionnaire to determine the practicality of using LKPD. The data collection technique in this study was the LKPD validity test and the LKPD practicality test. The validity test conducted in this study is to use the opinion of experts. The validity data were obtained from the LKPD validation sheet which was validated by 4 validators, namely 2 lecturers of mathematics education FKIP UIR

and 2 teachers of SMP Negeri 1 Siak Kecil. While the LKPD practicality test was conducted on 27 students in class VII SMP Negeri 1 Siak Kecil.

The data analysis technique that will be used is descriptive analysis. Data analysis was carried out by calculating and describing the results of the assessments of the experts. The validated learning tools are in the form of LKPD. In addition, the level of practicality of the LKPD being tested is also determined. The validity criteria from the modified validation sheet results and the practicality level criteria for LKPD are presented in Table 1 and Table 2 below.

Table 1. Validity Level of LKPD Validation Sheet

No	Validity Criteria	Validity Level
1	$85\% < x \leq 100\%$	Very valid, or can be used without revision
2	$70\% < x \leq 85\%$	Sufficiently valid, or can be used but needs minor revision
3	$50\% < x \leq 70\%$	Less valid, it is recommended not used because it needs major improvement
4	$1\% < x \leq 50\%$	Invalid, or cannot be used

Source : (Akbar, 2017)

Table 2. Modification of LKPD Practicality Level

No	Practicality Criteria	Practicality Level
1	$80\% < x \leq 100\%$	Very practical
2	$50\% < x \leq 80\%$	Enough
3	$25\% < x \leq 50\%$	Less practical
4	$0\% < x \leq 25\%$	Not practical

Source: modification (Akbar, 2017)

Result and Discussions

This research is development research, namely the development of Student Worksheets (LKPD). The purpose of this study was to produce Student Worksheets (LKPD) using the *Problem Based Learning* (PBL) model on valid and practical Class VII Social Arithmetic material. The procedure for developing Student Worksheets (LKPD) using the 4D development model has several stages, namely define, design, develop, and disseminate. The development stages are presented in Figure 1. Further explanation of these stages is as follows.

Stage the Define

Stage *first* step to obtaining information about the LKPD used by the mathematics teacher of SMP Negeri 1 Siak Kecil. Stage *define* is divided into 5 stages of analysis, namely: (1) *Initial-Final Analysis* obtained from the results of interviews with researchers with mathematics teachers at SMP Negeri 1 Siak Kecil; (2) *Analysis of students*, based on information obtained from interviews with mathematics teachers, it is known that there are still many students who are not active or passive in the teaching and learning process. In addition, because books that do not meet the needs of students and are not by following per under the characteristics of students; (3) *Task Analysis* activity that the researcher carried out in the task analysis was to analyze the Basic Competencies (KD) related to social arithmetic material so that the Competency Achievement Indicators (GPA) were obtained which were then used as a reference to determine the tasks to be given to students; (4) *Concept analysis*, the activities carried out in concept analysis are identifying, detailing and systematically compiling concepts from the material developed based on the 2017 edition of the mathematics book on KD social arithmetic;

and (5) *the formulation of learning objectives*, based on the results of task analysis and concept analysis conducted by researchers, then arranged into learning objectives by following per under KD which are applied to teaching materials in the form of LKPD.

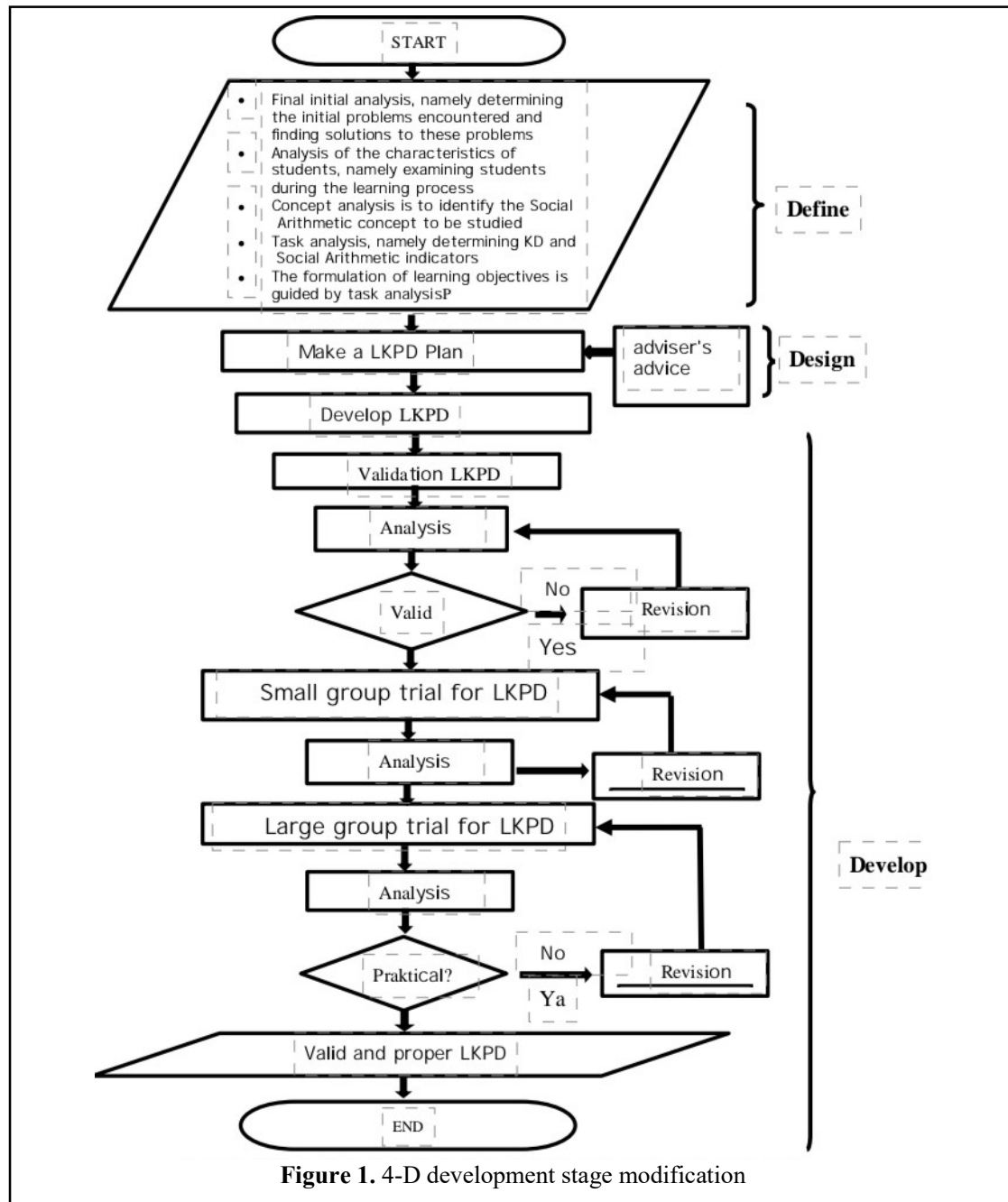


Figure 1. 4-D development stage modification

Stage Design

At the design stage, *the* researcher makes an initial draft of the developed Student Worksheet (LKPD). The activities at this stage are as follows: (1) The selection of media in this study is print media in the form of Student Worksheets (LKPD); (2) The selection of the format, the LKPD compiled is adjusted to the stages of the *Problem Based Learning* (PBL) model developed. LKPD compiled contains steps to find concepts and solve problems on social

arithmetic material so that students can be active in learning activities; (3) The initial design at this stage carried out by the researcher was to make the basic form of the LKPD and research instruments. An example of the LKPD format is presented in Figure 2 below.

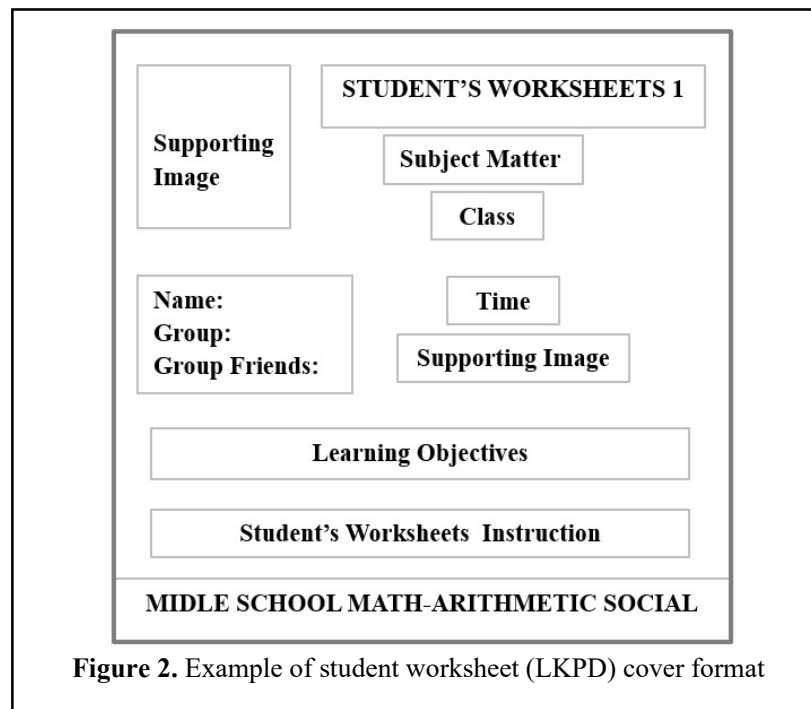


Figure 2. Example of student worksheet (LKPD) cover format

Stage Develop

At the *Develop*, the researcher develops the LKPD which refers to the lesson plans made with the *Problem Based Learning* (PBL) model. Then the product developed was validated by 4 validators, namely 2 lecturers of mathematics education at FKIP UIR and 2 teachers at SMP Negeri 1 Siak Kecil. With the validation process, researchers can find out errors and deficiencies in the products that researchers develop. As for some suggestions and comments from the validator, namely: 1) LKPD is not complete and the sequence has not been adjusted to the syllabus and lesson plans. 2) there is too big a room given. 3) which comes first, concluding phase 4 Problem-Based-Learning. 4) add time allocation for LKPD work. 5) Correct the picture in LKPD-5 to make it clearer. 6) correct the information on the meaning of interest in LKPD-3. Based on suggestions and comments, the validator can improve the product that the researcher develops so that the resulting product is suitable for use. Table 3 follows the average LKPD validation results for each validator.

Table 3. Average Results of LKPD Validation Each Validator

No	LKPD	Persentase Validitas (%)				Rata-rata (%)	Kriteria
		V1	V2	V3	V4		
1	Meeting 1	81,25	87,5	100	98,75	91,88	Very Valid
2	Meeting 2	81,25	85	100	100	91,56	Very Valid
3	Meeting 3	81,25	88,75	100	100	92,5	Very Valid
4	Meeting 4	81,25	91,25	100	98,75	92,81	Very Valid
5	Meeting 5	81,25	92,5	100	100	93,44	Very Valid
Total average						92,44	Very Valid

Source: Researcher processed data

Based on the results of the LKPD assessment that has been calculated from the four validators, the total average score is 92.44% with a level of validation very valid. The example of the final validation results from the LKPD is presented in Figure 3 below.

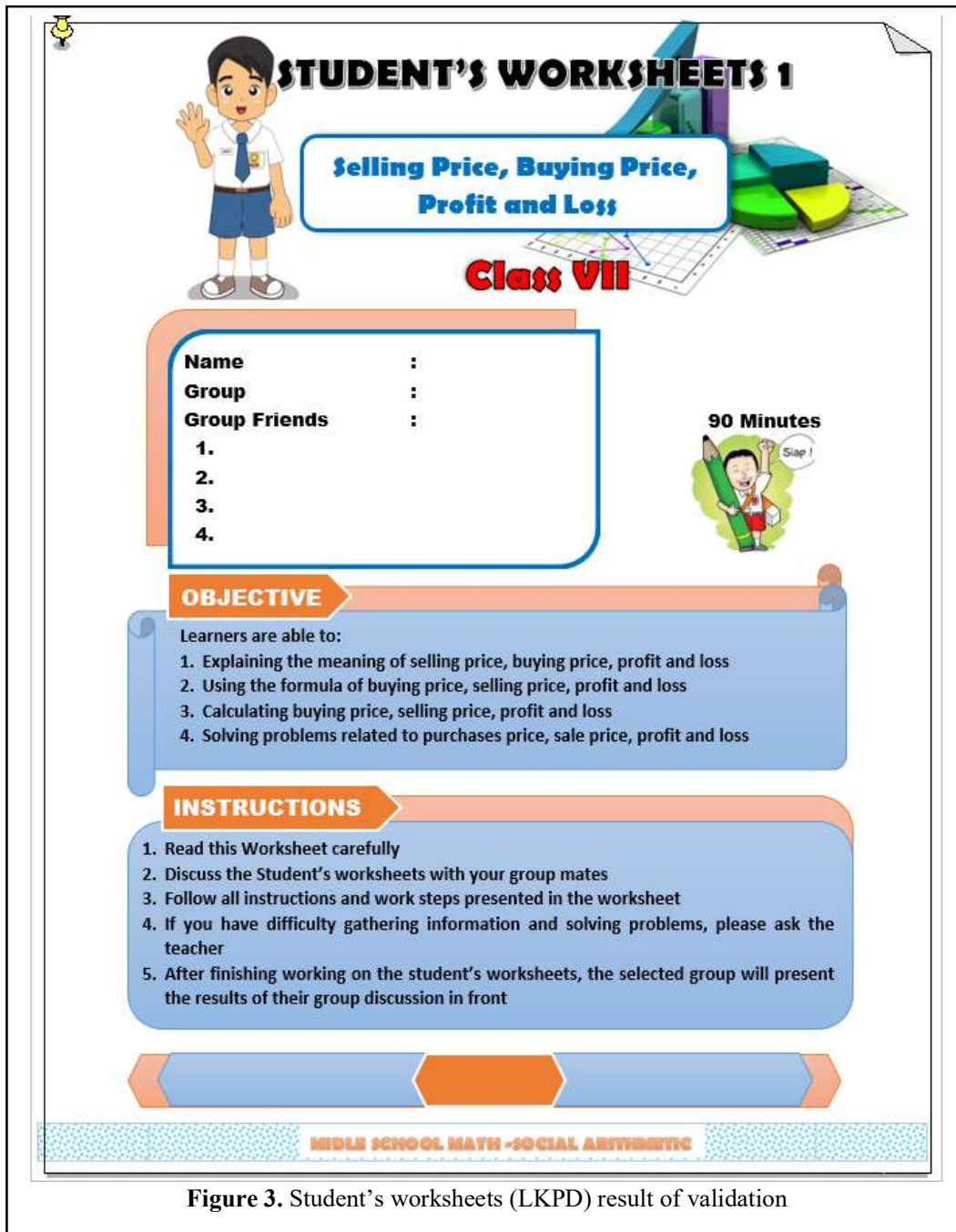


Figure 3. Student's worksheets (LKPD) result of validation

Next, the step taken by the author after the LKPD is validated by the validator and then revised is the LKPD trial. The trial was conducted on Thursday, July 14, 2022, and was carried out on a large group. The research subjects were 27 students of class VII SMP Negeri 1 Siak Kecil. This trial was conducted to see the practicality of the LKPD with the PBL model on social Arithmetic material for class VII SMP/MTs. In Table 4, the average practical results of the LKPD are presented based on the aspects.

Table 4. Average Results of LKPD Practicality

No	Aspects Assessed	Percentage (%)	Category
1	Material on LKPD	75,31	Enough
2	Display on LKPD	76,85	Enough
3	Easy to use LKPD	96,30	Very Practical
4	Contextual-based problems	90,74	Very Practical
5	Attitudes developed by LKPD users	100	Very Practical
	Rata-rata	87,84	Very Practical

Source: *Researcher Processed Data*

Based on the average obtained in each assessed aspect, the average score is 87.84% with a very practical level of practicality. The validation results from this expert show that based on what has been done in the previous validation, it is proven to obtain better results (Boateng et al., 2018). Therefore, with the support of previous research, PBL with its characteristics is able to arouse students' interest in learning and learning attitudes towards mathematics, especially in social arithmetic material (Amalia & Lestyanto, 2021; Nuraini et al., 2020; Prisiska et al., 2017). This is also because the learning process is related to social life and everyday problems faced by students.

Stage Disseminate

The researcher distributes the product, namely LKPD to two mathematics teachers at SMP Negeri 1 Siak Kecil and mathematics teachers at SMP Negeri 3 Siak Kecil. This distribution is done so that the LKPD developed by researchers can be used by teachers in any school. The results of this study were then strengthened by the results of previous studies that the dissemination process could be carried out if the developed device had been proven valid and practical to then be tested for effectiveness (Siswati, Rezeki, Sthephani, & Angraini, 2021; Nababan & Iskandar, 2019). In addition, the purpose of distributing learning tools is so that teachers are more varied in carrying out the learning process. With the development of learning tools commonly used in the classroom, it is hoped that teachers can be more innovative in developing learning tools with different materials according to relevant models and approaches. Because of this, teachers' pedagogical knowledge can always develop according to the demands of time and changes in teaching paradigms (Suripah et al., 2021).

Conclusion

Based on the results of the analysis of the research data above, it can be concluded that a learning device in the form of LKPD with a *Problem Based Learning* (PBL) model on social arithmetic material for class VII SMP/MTs has been tested for validity and practicality. The results of the LKPD validation are in table 3 with an average score of 92.44% with a very valid validation level. And the results of the practicality of the LKPD are in Table 4 with an average score of 87.84% with a very practical level of practicality.

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