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Designing Numeracy Assisted E-Learning Using Palembang Tourism Context during the Covid-19 For Pre-Service Primary School Teachers

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Abstract

Learning after the COVID-19 pandemic,where learning facilities utilized Information technology (IT) assistance where lecturers used the SISFO University PGRI Palembang e-learning learning platform. This study aims to produce teaching materials in the form of LKM (Student Work Sheets) assisted by Sisfo Palembang e-learning which is valid, practical and has potential effects. The research subjects were 38 3rd semester students at PGRI Palembang University. Methods This research is a design research, development research which has two stages, namely preliminary evaluation and formative evaluation. Formative evaluation includes evaluation of curriculum and teaching materials, one-to-one conducted on 3 students, expert review of 3 experts, and small groups of 6 people and field tests with prospective elementary school students. Data was collected through guides, interviews, and documentation about the PISA 2022 framework. The context is student tourism in the COVID-19 era on statistics and geometry. Data were analyzed descriptively. The results of this study are to produce prototype student worksheets that are valid, practical and have a good potential effect where learning supports mathematical numeracy in accordance with the 2022 PISA Framework which consists of content, constructs and language, as well as context, level of problems, and processes in learning mathematics itself.

Keywords : COVID-19, Design, Numeracy.

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INTRODUCTION

In the 21st century, the world is entering the era of the industrial revolution 4.0, where technology plays an essential role in human life. This era was greatly influenced by various aspects of life, such as economics, culture, politics, and even the world of education. Industry 4.0 is a phase of the technological revolution, which is being transformed by human activity in scale, scope, complexity, and transformation from previous life experiences (Ghufron, 2018) . The development of the times and technology demands developments in various fields of life, including education. Quality education will result from quality resources. Developing

elementary mathematics learning through the Merdeka campus curriculum gives lecturers authority in their knowledge to modify or add and delete material or output that will be produced in their learning. Research lecturers, teaching lecturers, and course supervisors have changed the independent learning curriculum. So far, the mathematics learning development course material has yet to be assisted by IT (E-learning) (Jayanti 2021). That research requires a hypothesis on the problem raised by students are expected to be tested to obtain answer, whether the hypothesis based on theoretical studies is true or false (Jumroh & Jayanti, 2021) . The need for a process of using technology needs to support the quality of education in Indonesia. According to Suharsimi (Yusuf & Widyaningsih, 2018), (Yusuf & Widyaningsih, 2018, p. 43) the evaluation process in learning is significant to know whether the learning objectives have been achieved. Evaluation can be done during the learning process by observing student activities during learning and after learning is done (Shanti Nur et al., 2018) . So the next year's research still uses IT (e-learning) SISFO as a mandatory application for students and lecturers to be able to develop children's character (Jayanti 2022) .

The character survey that will be applied to middle-level students, namely grades 4, 8, and 11, is reflected in the AKM as a substitute for the National Examination (UN) (Kemendikbud, 2020b). At (Catherine, n.d.) AKM aims to map school and regional competencies based on minimum competencies related to literacy and numeracy based on sound educational practices at the international level, such as PISA and TIMSS. New challenges in mathematics education today with the emergence of educational changes both in content and pedagogically prepare students for 21st-century skills and deep mathematical reasoning (Gravemeijer et al., 2018); (Stacey. K, 2015). As reflected in the international system (OECD, 2018); (NEA, 2011) (GLN, 2017) also decided that in the 21st century, students must have various skills, both critical thinking and problem-solving, communication skills, creativity and innovation, and collaboration. In line with the importance of the PISA above as mapping incompetence which is seen as a monitor in measuring student abilities at the international level (OECD, 2019) ; (National Education, 2020) ; (Kemendikbud, 2019). However, the facts or evidence of the actual existence of PISA results are consistently below the country's average capability (OECD, 2019) and the Pedagogical Capabilities of teachers in Indonesia are not satisfied with the results (Caraka & Maryani, 2016) ; (Rahman, 2014) ; (Febrianis, Irma Muljono & Susanto, 2014) ; (Syahruddin et al., 2013)). Some of the factors that affect weak student performance are Insufficient results obtained due to lack of readiness in questions on worksheets that measure higher order thinking skills (HOTS) or lack of ability to solve non-routine problems, lack of ability designed based on PISA in math assignments and the structure

of the language (Zulkardi & Kohar, 2018) and many teachers only prepare theory, and also only a limited number of concepts and maybe students are not trained to measure students' thinking abilities (Putri & Zulkardi, 2018) .

The process of thinking skills that use mathematical concepts, procedures, facts, and tools to solve everyday problems is called numeracy, which uses a cooperative context for individuals as citizens of Indonesia and the world (GLN, 2017) ; (Saraswati & Agustika, 2020) ; (Hartatik. Sri, 2020) ; (Mahmud & Pratiwi, 2019) ; (Maulidina.AP & Hartatik, 2019) . Numerical ability is an ability that students must have, such as giving reason and convey ideas effectively, formulate, solve, and interpret mathematical problems in various forms and situations (Jayanti & Jumroh, 2021) , In line with that, the ability to think is something that humans and mathematics can relate to the real world, which is also called the Indonesian Realistic Mathematics Approach (PMRI) (M. Jayanti, 2021) ; (Sembiring, R, Hoogland, K., 2 010) (Maisyarah & Prahmana, 2020) ; ; (Putri & Zulkardi, 2019) ; (Syutaridho et al., 2016). Thinking processes can be supported with the right technology and e-learning media. E-Learning-based learning is learning that connects educators and students online and connected to the Internet (Elyas, 2018); (Elyas, et al., 2018; (Jayanti & Jumroh, 2021); (Hanum, 2013) .

The Learning primary mathematics development courses assisted by sisfo e-learning in the primary school teachers education study program is one of the courses that address mathematical problems in a more developed way. It can be seen that the importance of mathematics as one of the main subjects in schools in forming quality thinking students to study problems logically and systematically (Arnidha, 2017) ; (Arnidha , 2017, and Dliwaul Umam, 2014) also as a basic science that is widely applied in various fields of life. According to (Damayanti & Mayangsari, 2017) mathematics learning for teachers and students in primary schools requires good interaction and is more than just focused on learning one-way mathematics. Mathematics learning only partially needs to affect directed learning (Jayanti & Jumroh, 2021) . Math learning is a subject that some students avoid because it is considered complicated and severe and only contains a collection of formulas (Malikha. Z, 2018) ; (Masitoh & Prabawanto, 2016) states that students' understanding of concepts in learning mathematics still needs to be improved, even though conceptual understanding is an essential basis and foundation in mathematics learning sequences so that students can easily follow advanced learning material in the process of reasoning.

In (Amir, 2014) reveals that Reasoning is a process carried out to reach logical conclusions based on knowledge relating to facts and various relevant sources. Meanwhile, according to (Tamboch, 2019) learning is suitable for understanding and responding to the needs of students and teachers, especially at the elementary school level. The learning process is usually carried out face-to-face between teachers and students at school. However, its implementation will be complex due to the Covid-19 pandemic. (Ministry of Education and Culture, 2020a) stated that the learning process was changed by using online learning methods to slow the spread of Covid-19 by always keeping a distance, thus requiring teachers to be more creative and innovative. This means that online learning is the right solution during the Covid-19 pandemic, so the learning process continues as usual, even at home. One of the competencies that plays an important role and is the main requirement in implementing learning is numeracy competence/ability. Numerical literacy is the knowledge and skill of using appropriate symbols and numbers in basic mathematics to solve everyday problems. Meanwhile, (Ayuningtyas & Sukriyah, 2020) state that arithmetic has three aspects: numerical relationships, arithmetic, and operations.

Numeracy learning used in COVID-19 is directed based on the context of the problem and consists of activities that lead to students' reasoning abilities. The theoretical study material has a background in research development (Jumroh & Jayanti, 2021) regarding the development of PMRI e-learning for prospective elementary school teachers and also in research using PMRI which develops the pedagogic competence of mathematics teachers that have been implemented in Indonesia (Zulkardi, 2002); (Putri & Dolk, Maarten Zulkardi, 2015); (Ekawati & Kohar, 2016) (Jannah & Prahmana, 2019) ; (Kusumah, YS & Nurhasanah, 2017) ; (Asari et al., 2018). Realistic Mathematics Education (PMR) is mathematics education that is implemented by placing reality and students' experiences as the starting point for learning (Jayanti, Zulkardi, Putri RII, 2021) , PMRI principles are mathematical material transmitted as human activity, giving students the opportunity for reinvention through put it into practice (do it). Based on the problems presented, students build models of (models of) situations to mathematical models (models for) to solve until they get formal mathematical knowledge (Jayanti & Marhamah, 2021). PMRI principles are material transmitted mathematics _ as activity human, give student chance to reinvention through put it into practice (do it). Based on problems presented , students build a model of (a model of) the situation to mathematical models (models for) for solve until they get knowledge formal mathematics (Jayanti et al., 2021) .

METHOD

The research design in the form of a development study was chosen in this study (Bakker, 2018) Subject study is 38 students in from 3D class. The steps taken are the preliminary stage and making a prototype (Tessmer, 1993) : (Zulkardi, 2002) ; (Akker, 2013) , such as seen in Figure 1.

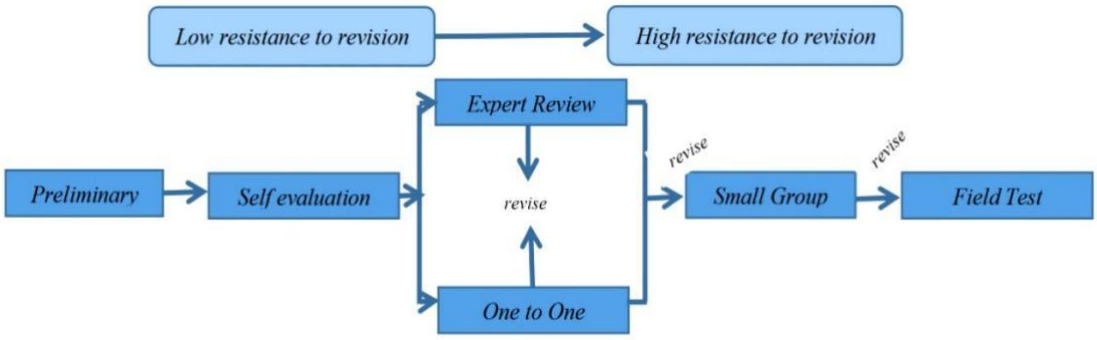


Figure 1: Prototyping Flow (Tessmer, 1993) ; (Zulkardi, 2002) ; (Akker, 2013)

In the expert review and FGD stages, prototype one that researchers had designed was reviewed and evaluated by experts (3 lecturers who usually research related to PISA, 16 Master and Doctoral students, primary teacher education Lecturer at PGRI Palembang University, IT Lecturers and Lecturers Language as many as three people) in terms of content, construction, and language. According to (Tessmer, 1993), the validation process at this step is carried out in 3 ways: email (mail review) and virtual panel review.

Study This discuss stage evaluation self in making prototype and results analysis show that MFI activities were reviewed by three study expert expert with focus group discussions and students group small and big as many as 1 class, which can be declared valid as well practical and easy understood. Types of research This is study design with use studies development consisting from preliminary stage and stage prototype. Data collection was carried out with documentation namely the PISA 2022 Framework. Data analyzed in a way descriptive. Result of study This is produce prototype sheet Work learning For support numeracy customized math with the PISA framework consisting of from content, context , level problems , and mathematical processes That Alone .

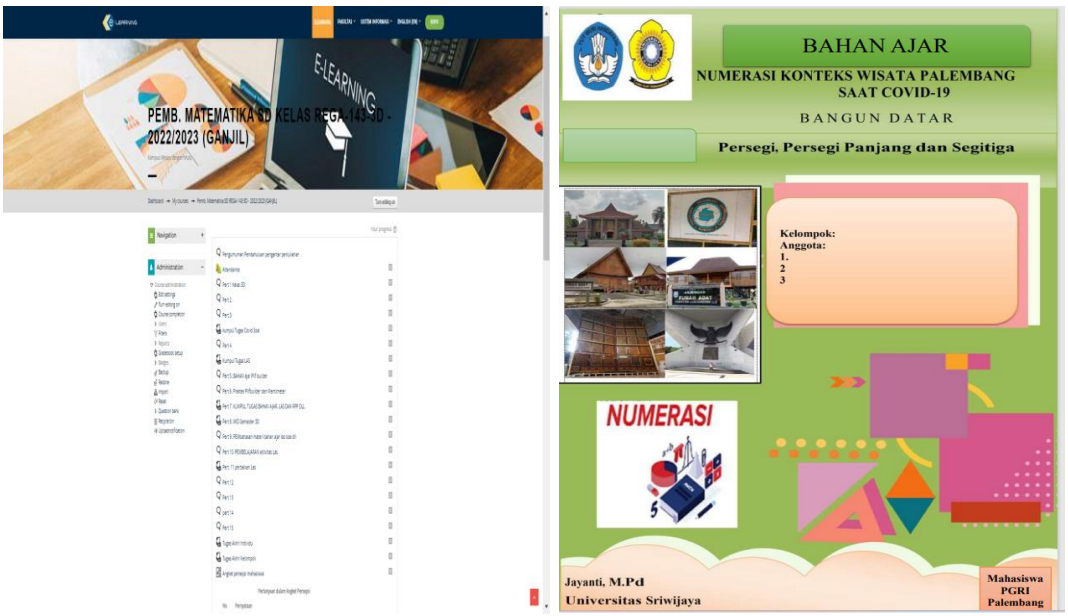
In this research, there are three PISA-like mathematics questions about Geometry, Shape and Space using the context of Tourism time Covid-19. The results of this research at each preliminary and formative evaluation/prototyping stage are shown below.

Researchers carried out student analysis, curriculum analysis, the PISA framework, and instrument design which included problem grids, question cards , and assessment rubrics. The development process is based on mathematical questions in the PISA Framework 2022 . The PISA questions developed tend to ask students to use their reasoning, provide arguments or opinions, and solve problems by making decisions.

At the prototyping stage, focus group discussions (FGD) and One too One (1-1) activities were carried out to see developments in the validity of PISA items. The FGD was conducted via Zoom Meeting involving PISA experts (researchers who have conducted PISA research), Ph.D. undergraduates, graduate students, and elementary school teachers. In parallel, one-to-one 3 students and small groups were carried out via Zoom Meeting and SISFO e-learning involving six students with heterogeneous abilities. Whereas for field test 1 class study.

RESULTS

The research results at the learning stage introduce Numeracy, PISA, where learning will be carried out for primary teacher education students. On (OECD, 2019); (Ministry of Education and Culture, 2019); (Jayanti & Jumroh, 2021), mentioned considering the slight increase in Indonesian students in the content of the mathematics domain in PISA, the decision to make PISA an international education standard in Indonesia. According to (Wijaya, A, Heuvel-panhuizen, M. Van Den, Doorman, M, Robitzsch, 2014). The underlying factors are students who are not used to solving problems like PISA, here with the teacher's limitations in giving assignments like PISA (Zulkardi & Kohar, 2018). It takes reasonable effort to overcome problems with PISA characters by including local contexts (Kohar et al., 2014) . Thus, Indonesian students will be familiar with PISA assignments. One clear example of a well-known context among students is COVID-19, which has become a pandemic for the whole world (Bakker, 2018). This context is an excellent example of Data and Uncertainty, the knowledge content part of the PISA 2021 framework (OECD, 2018). Various shapes of flat shapes are studied in this geometry, such as flat rectangles, rectangular lengths, and triangles, which use an e-learning system at PGRI Palembang University.



Picture 2 . Sisfo e-learning at PGRI University Palembang

Figure 2. Shows an online platform where the PGRI Palembang University sisfo holds the E-learning Assisted Elementary Mathematics Development course. The process of developing numeracy teaching materials (PBN) for numeracy teaching materials and minimum competency assessment questions (AKM) has been carried out starting from analysis, design, and prototyping (self-evaluation, Expert review (expert)/FGD, one too one, small groups). , and field tests/field tests, where each step taken in learning is based on the characteristics and principles of PMRI.

The research on the development of numeracy teaching materials using the Palembang tourism context during Covid-19 has produced 3 activities and 3 numeracy evaluation questions through a more specific context, including: regarding the Palembang City LRT, the South Sumatra Pavilion, the Besak Palembang city fort, the Big Al-Quran House, and the Museum B ala Putera Dewa.

Data obtained in the form of student answers, student opinions, photos and videos of learning activities while working on teaching materials and questions. The data has been analyzed and summarized descriptively. Represents results from material developed numeracy teaching itself, based on in a Canva PDF file, which is then adjusted from the design of the numeracy questions using numeracy learning assisted by e-learning SISFO based on content and also level at the reasoning stage. The above is the creation of numeracy teaching materials which are produced in PDF form to be implemented for students at PGRI University in Palembang.

***Expert Validator and Focus Group Discussion* (FGD)**

Constructive comments and suggestions from FGDs and 1-1 activities were considered for revision

prototype. Table 1 presents comments and suggestions from expert and student reviews.

In this FGD process, validators provided comments and suggestions on prototype 1 which was displayed on the Zoom screen. Table 1 shows comments and suggestions from validators for the numeracy questions as follows.

Table 1. Comments and Suggestions for Numeration Teaching Materials

Validation	Teaching materials	Comments and Suggestions	Revision
FGD (Focus Group Discussion)	In Activities 1 to 3	- The questions developed are already at the level of reasoning, there are good sentences corrected to make them visible and more interesting - Geometry questions, explain again - An image retrieved from the content must render the source image - Introducing Applications used in e-learning for teaching materials used by students - In the design of the activity, especially the Sharing Task and Jumping Task, use the symbol among them and don't make mistakes in writing	- Fixed sentences adjusting EYD. - Image Source clarified from Results Data taken from tourism researchers in 2022
	Questions/ Evaluations	- In the test questions to the level of student reasoning, adjust the questions or statements to the EYD domain guidelines - Clarify pictures and provide descriptions	- The question image is given a description of the source
1-1 (One Too One)	Activities 1 to 3 and questions	- I understand the problem but the pictures have unclear numbers in the known pictures - I get an important point from the question	- - Replacing the question form with a language familiar to students
Small Group	Teaching materials	- The use of images that look unattractive and small	- Replace images with colors and make again

One Too One (1-1)

In the one-to-one results, students were directed to read teaching materials in the form of LKM teaching materials in the e-learning system at PGRI University in Palembang.

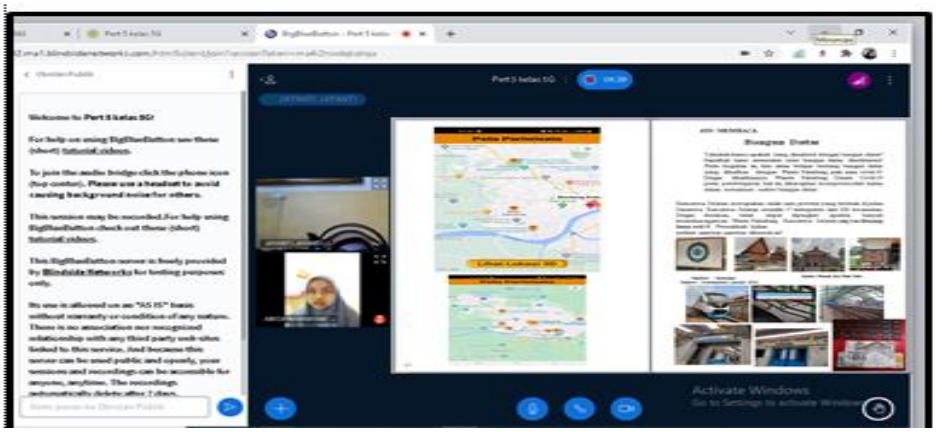


Figure 3 . Introductory Activities Materials Teach numeracy there is One Too One

In Figure 3. the first activity can be seen that students have to reason in reading the question graph in the Sharing assignment, getting a location map of tourist locations in Palembang such as the Palembang City LRT, the Palembang Dekranasda Traditional Pavilion House, Kuta Besak Fort (BKB), MONPERA (Monument of the People's Struggle) , the House of the Great Koran and the Bala Putra Dewa Museum .

Many have had to learn about PISA in the context of previous COVID-19 studies, for example (Zulkardi et al., 2020) , discusses how students work with mathematics. Assignments such as PISA use the context of COVID-19 , (Nusantara et al., 2020) which applies the context of physical distancing, (Nusantara et al., 2021) ; designing mathematical Tasks such as PISA using the context of COVID-19, and (Nusantara et al., 2021) ; use the COVID-19 transmission context map. Learn other levels of difficulty (Ahyan et al., 2014) . Meanwhile , several previous studies looked at the influence of reasoning, mathematics, and communication among mathematics students' literacy (Noviarsyh Dasaprawira et al., 2019) and representatives (Efriani et al., 2019) , the current value of Covid-19 tourism in the city of Palembang.

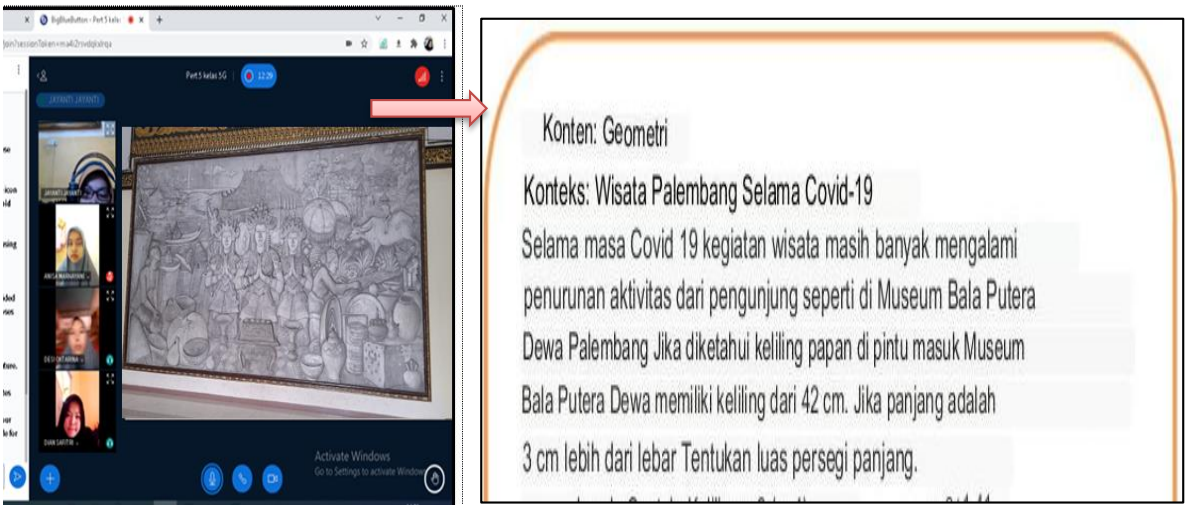


Figure 4. Questions that take the context of Figuras in the kingdom of the Son of God

Figure 4a . Showing Discussion Questions about flat shapes in One 2 One where Context Palembang tour which shows a picture of a rectangular shape.

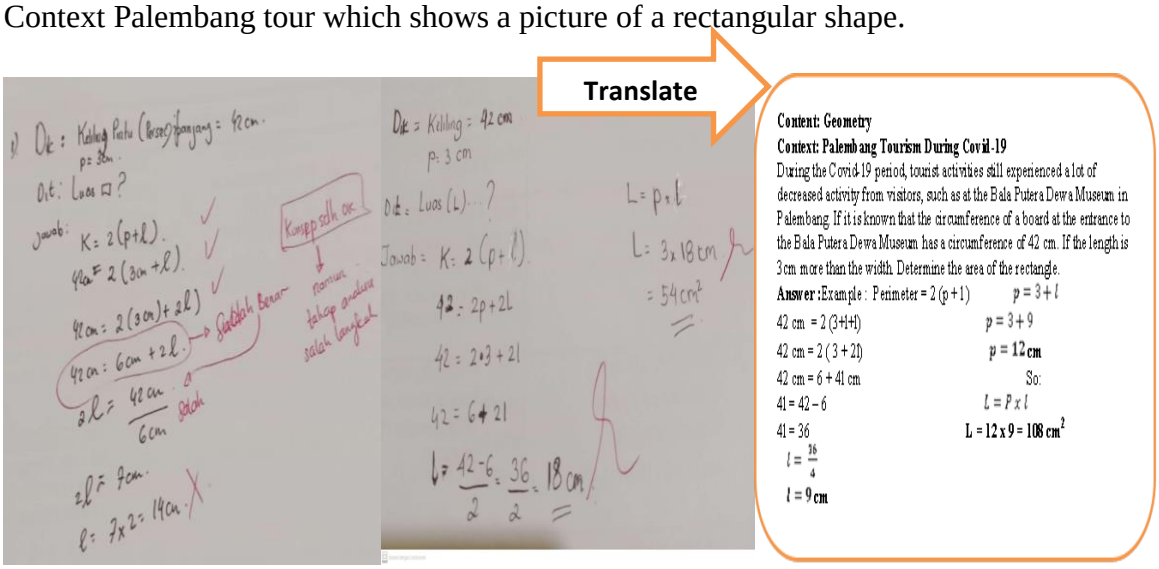


Figure 5a. Wrong Answer Figure 5b. Answer Correct

Figure 5a. Shows how students' reasoning abilities in solving problems in look for around Rectangle while Figure 5b. Already showing truth in solution question search around . Showing How ability reason student in finish question. The prototype is declared valid, reflected in expert comments and suggestions, and understanding of the problem is reflected in this research. This research is in line that questions are objects that use the context that exists in our daily lives. (Jayanti & Jumroh, 2021). After getting the results from experts and one to one, the data is then analyzed to obtain the validity of the expert data so that the result becomes Prototype 1.

Small Groups

Small group stages were carried out involving six students from other classes who were not research subjects but were students who were also trained in the Basic Mathematics Learning Development course where the subjects in this small group worked individually.

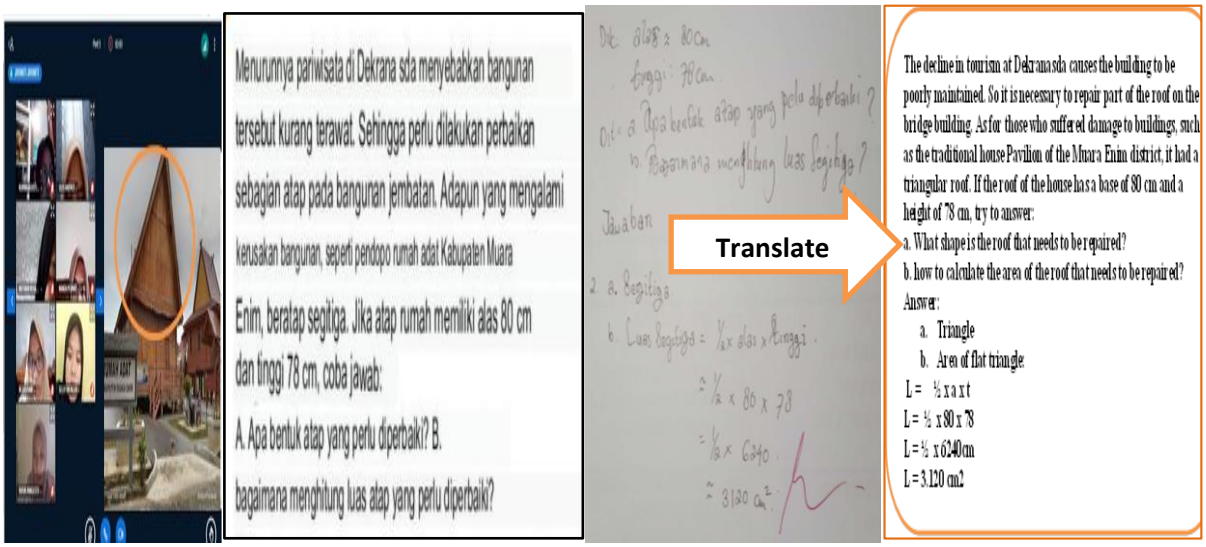


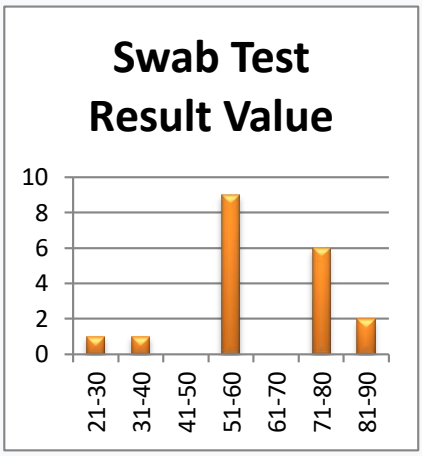
Figure 6 . Discussion about the context of Palembang City Tourism , namely the Muara Enim Traditional House

It can be seen in Figure 6. from the student 's display that reading the image is a bit difficult because when photographed, the image data is not clear or small. Therefore, further revision is needed so that the LKM data in this numeracy teaching material can achieve practicality in terms of language and the context of the content in this teaching material.

Field Test / Field Test

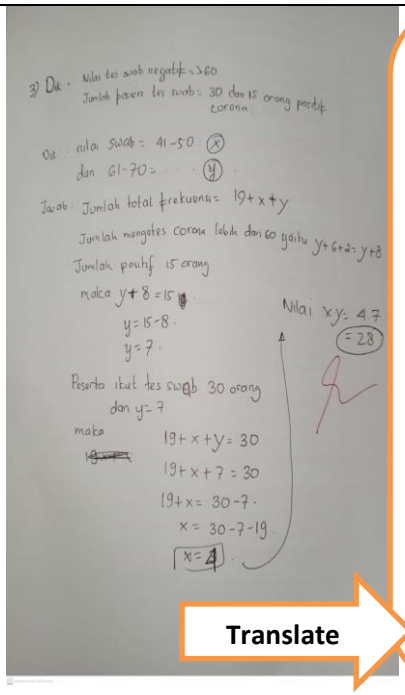
The field application is applied to Mathematics Learning Development students of PGSD undergraduate students. Figure 7 (a) Learning statistical data can be interesting to take into everyday life using PMRI (Jumroh & Jayanti, 2021) ; (Nusantara et al., 2020) produces an understanding of student learning contexts in the real world for the concept of average or mean in covid-19 statistical data. This can be seen from the description of the context chosen in making arithmetic questions in the context of statistical data in Palembang which requires reasoning for elementary school students. The contents of the questions are about Statistical Data on Covid-19 Sufferers.

Look at the bar chart patient moment Community Health Center Swab Test Jakabaring below This!



Jakabaring Palembang residents are declared negative for the corona virus if the negative swab test result for the corona virus is more than 60. If the number of swab test patients is 30 people and 15 people are positive for the corona virus, then the swab test value is 41-50 and 61-70 is =.. ....

(a)



Answer:

For this question, our expected ability is the logical ability to read data, because the data presented in the table is not complete. The total number of frequencies is 19+x+y
The number who tested corona is more than 60, namely y+6+2=y+8
It is known that the number of participants who tested positive for corona was 15 people.
then y+8=15 →y=15-8→y=7
It is known that the number of participants who took the swab test was 30 people and y=7 then 19+x+y=30 →19+x+y=30
19+x=7=30→x+26 = 30→ x= 30-26 →x=4.
so, Value xy = 4·8 = xy = 4·8 = 32

b)

Figure 7. Student Questions and Answers in Numeration in the Statistical Context

In answer 7(b). In the matter here, students need correct reasoning. They can fooled with his wish Because many just focus on existing statistical data without know moreover formerly what form of data ? only one can We arrange , then develop ability reasoning For solve problem in context the . in line with study (Jayanti, Zulkardi, Putri RII, 2021) about numeracy where students can directed For solve existing problems in life every day (Jumroh , 2020) and (Duano , 2020) research about covid-19 can be very useful in children 's things have interest For guard health them and the environment .

Mark	Results	Category
86 – 100 71 – 85 56 – 70 40 – 55 0 – 39	9 20 9	Very good Good enough Not enough Very less
Amount	38	
Average	$Persentase\ (P) = \frac{31}{38} x\ 100\%$ $= 81{,}57\%$	Good

(Modified **Learning Outcome Categories** in Jayanti 2020)

In PMRI learning, they are asked to carry out practicum activities by following work steps and continuing with answering questions in the LKM teaching materials. The researcher designed practical activities, this was intended so that students in each group could carry out concrete activities that lead to the search for the concepts being studied so that the new knowledge gained by students could last a long time. In addition, through practicum activities, students are expected to be able to apply various kinds of science process skills and scientific attitudes that support the acquisition of knowledge (Suryaningsih, 2017) . Many students are active and try to construct their knowledge from real objects to abstract ones using Numeracy Learning with the characteristics of PMRI itself. The various things that make up the difference in learning, along with what each group puts forward will certainly increase the breadth of understanding and knowledge received by students . It can be seen that the learning outcomes are significant in the ability of students' learning activities and appear to have worked well in the process, as can be seen from the results of the learning tests whose results are above the criteria for completeness.

The rate good average with value 81.57% so it has a good potential effect. In line According to Goll, Gall, and Borg (Putra et al., 2016 , p. 84) said that *Research and Development* in education is an industry-based development model which aims to design certain products and procedures based on the findings of research conducted, which will then be tested systematically , evaluated and finally refined so that it meets the effectiveness and quality criteria. Likewise, the development carried out in this research is to produce products in the

form of LKM teaching materials using PMRI built by Edmodo e-learning whose quality has been tested both in terms of validity, practicality and effectiveness.

This is the opinion of Nieeven (Siswono, 2019) "High-quality material which refers to the criteria namely validity, practicality and effectiveness." A teaching material developed can be of high quality if three aspects are met: validity, practicality, and effectiveness.

Furthermore, this research can develop a learning environment from campus to school, which is used for the next stage in training. Can students make numeration-based teaching materials and questions for the school level in collaboration with tertiary institutions and lecturers at the PGRI Palembang University in synergy with prospective pre-servie primary school teachers

CONCLUSION

This important to develop numeracy learning that is diverse and balanced in terms of content, knowledge, context, and level of difficulty in learning and questions. The development process has produced three valid and practical numeracy activities and problems. The validity of numeracy teaching materials is seen from the FGD and prototyping stages regarding content, construction and language. The practicality of the PISA questions is seen from the small group phase as a trial in e-learning assisted numeracy learning . Numeracy teaching materials obtain revised prototypes that can be easily understood and interpreted well by students who are different both in terms of reasoning, argumentation, interpretation, and decisions based on facts and data in the field show that prospective elementary school teachers have been able to create numeracy teaching materials and also the results at the field research level show that students have been very effective in creating teaching materials and in working on questions / evaluations. Furthermore study This will develop environment learning on campus until to school place of research object in the field , using the internet.

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