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Validity and Reliability: An Ability Assessment Instrument to Identify the Number Concept

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Abstract

This study aims to develop an instrument of assessment of the ability to recognize the concept of the number for the children in Kindergarten. This research is development research by applying RDR model research (Research, Development, Research). The subjects in this study were students of group A kindergarten in Buleleng Regency. Variables studied are instruments of introduction to the concept of numbers that become the necessary foundation in mathematics learning. Data collection is done using questionnaires and interviews. The data obtained is analyzed with the help of Microsoft Excel 2010. The results of this study state that the validity and reliability of the instrument are categorized very well. The effects on the validity test are indicated with a score of 0.91. As for the results of the reliability, the test gets a score of 0.81. This research is expected to be used as a reference in the learning assessment process for the children in Kindergarten in knowing the concept of numbers.

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Introduction

Each individual has different abilities. Human beings have their uniqueness, that is not the same as others. The essence of the possessed should be developed and directed towards the right way. A place that can accommodate and develop the abilities of each individual is one of them through education. Every individual has the right to receive an education (Hartati, 2017; Megaswarie, 2020). However, in reality, not all can enjoy education well.

Education has an essential role in life. Education plays a role in developing the potential of each individual. Education can be obtained through formal and informal education (Sari & Setiawan, 2020). According to regulation Number 20 the Year 2003 concerning National Education System and it is stated that education is an effort to realize and develop the potential of learners to have spiritual, religious, self-control, personality, intelligence, noble morals as well as skills necessary for themselves, society, nation and country (Suyadi, 2016).

Education is also a thing that helps students to develop with the many activities that can be done while studying. The activities can help students to get to know new things (Rachmat, 2017; Setiawan, 2018). Students can also form by creativity according to their abilities. Besides, students can socialize and increase knowledge through activities

participated during the learning process. Learning done in the classroom and outside the classroom (Susilawati et al., 2018).

To start the current education can be realized by going through Early Childhood Education (PAUD) (Suyadi, 2016; Talango & Pratiwi, 2018). One of the services that can be taken to develop early childhood potential is through kindergarten or kindergarten. Kindergarten is a formal education aimed at children aged four to six years. Children can be divided into two groups to separate them based on their age (Susilawati et al., 2018). Children aged four to five years can be classified into group A while children aged five to six years are classified into group B.

Early childhood education is the beginning of children's educational process before continuing the level of primary education (Aini, 2016; Gandana et al., 2017). Early childhood education is classified into three parts, namely formal education pathways, non-formal pathways, and informal pathways. Formal pathway education can be realized through Kindergarten and Raudhatul Atfa, non-formal pathway education can be done through Play Groups, and Daycare and informal path education can be taken by following family education or education around the environment (Aini, 2016; Gunartha et al., 2019).

Education taken by formal, non-formal, and informal education is equally important and has a role in children's development. The children will grow and develop with their age. The importance of introducing education to children early on teaches them that new things they encounter in everyday life have a cause and effect relationship that they can learn through education. In education, they are trained to know the concept and can be applied directly in everyday life. However, some aspects must be considered in the development of the child (Susilawati et al., 2018).

Children's development at an early age includes six aspects that refer to the Education and Culture Regulation (Permendikbud) Number 137 of 2014 concerning the National Standards of Early Childhood Education. Six elements that can be developed are religious and moral values, motoric, cognitive, language, social-emotional, and art (Suyadi, 2016; Zahro, 2015). Cognitive development becomes one of the most important of these six aspects. However, growth in other factors remains to focus on a process of learning and early childhood development.

Cognitive development occurs in early childhood related to thinking ability and problem solving (Megaswarie, 2020; Pradana, 2016). The ability to believe in children can be trained early by teaching their thinking skills. Also, problem-solving skills are carried out so that children are trained early on to overcome every problem faced in everyday life. With the ability to solve problems, children are expected to think critically in the face of every situation encountered. Cognitive development in early childhood can help children to simplify the problems they encountered (Liwis, 2017).. One of the things that belong to cognitive development is knowing the concept of numbers 1 to 10. Introduction to the idea of numbers 1 to 10 train children's thinking skill as the basis before entering basic education with more complex materials. It also underlines the need to know the child's cognitive development to be applied in real life.

The introduction of numbers 1 to 10 is also an introduction to the concept of simple numbers that can be developed and learned early on. Many activities or activities lead to the introduction of a simple number concept. This stimulation is useful to direct children in giving the perception of something they hear or see. The activities carried out can be related to a large number of objects around (Gandana, 2017; Liwis, 2017).

Knowing the concept of numbers is not solely to introduce the form of a number. However, the purpose of introducing the idea of numbers in early childhood has a specific purpose. According to Japa and Suarjana, the purpose of introducing the concept of numbers in anal is to facilitate children to be able to mention many of an object, introduce the price

and give the value of goods and services related to daily life, and mention the characteristics and properties of an item based on observations made (Liwis, 2017).

There are several stages carried out in knowing the concept of numbers (Susilawati et al., 2018; Liwis, 2017). The steps that can be done are knowing and reading numbers. In understanding and reading numbers, children are taught to hear orally, recognize number symbols, and read written signs. This aims to provide opportunities for children in giving the perception of what they see. The next stage is, writing numbers after the child is taught to recognize numbers through oral and symbols, then the next child is taught to write numbers. At this stage, the role of teachers to lead and set examples is very important to do (Sari & Setiawan, 2018)..

The next stage is to introduce the number of cardinal and ordinal. The number in question is a statement related to many objects. The last step is teaching children how to calculate. This activity is included in breeding skills. At this stage, the child is stimulated to mention the number according to the number's name. These four stages make it easier for children to know numbers because of sorted and coordinated activities. Reys states that the principle in mentioning is also related to the number of objects (Pradana, 2016).

Fatimah (2009) corroborates the opinion about the stages of knowing the concept of numbers utilizing quantity recognition, memorizing the sequence of numbers, calculating rationally carried out with several related activities, counting forwards, counting downs, and counting jumps (Susilawati et al., 2018).. Activities in knowing the concept of numbers indirectly stimulate the child to remember small things that begin with numbers (Susilawati et al., 2018).

During this time, teachers have developed many activities to motivate students of mathematics learning, especially in introducing numbers. However, it is not claimed that obstacles and obstacles trigger some mistakes in the learning process. Besides, monotonous activities make learning feel dull in the absence of variation. This affects children's cognitive development in the learning process (Susilawati et al., 2018). Many things inhibit children's cognitive development. Many factors can influence the development of the child. Factors that can affect, such as the ability of children, parents, teachers, and the environment that play an active role in children's development. Based on the results of preliminary studies done in children Group A kindergarten, children with a range of ages four to five years do not have the cognitive ability to know the concept of numbers completely. It was found that children in group A can mention numbers but have not yet achieved the ability to recognize number symbols and show the sign following many things.

Another problem encountered is the lack of knowledge of teachers in developing and designing assessment instruments under students' ability to recognize the concept of numbers. Teachers' lack of understanding in creating a tool resulted in a less optimal assessment carried out so that the assessment's accuracy is still low. It is necessary to optimize the evaluation of children's abilities, especially with different children's knowledge. The reference in the assesment that still relies on students' learning outcome or portfolio as the basis in students' assessment (Susilawati et al., 2018). The use of portfolios or files of students' work shows the need for definitive reference in determining students' learning outcomes. The portfolio used can be one of the sources of information used to develop an instrument. Development based on student learning outcomes will produce instruments that can assess students' ability with more maximum results with the indicators and scale used.

Many solutions can be offered a cause of the problem faced. However, the issues found in the field can be solved by designing and developing the right instruments as a reference for early childhood development in understanding numbers. The device to be used should have the main requirement as a viable instrument. A possible instrument's primary condition is good validity and reliability (Susilawati et al., 2018). The instrument developed

must have an adequate level of validity and reliability to be used and applied as with its functions. The feasibility of a tool is determined by the content and accuracy of the instrument. The content or content of a device is related and appropriate to the target to be intended. Before it is declared feasible, the tools developed must go through several to get maximum results (Susilawati et al., 2018).

The most influential thing in assessing the assessment quality is the instrument used (Alam et al., 2019; Arifin, 2017). The assessed stuff while in school is the level of students' ability to understand, analyse, synthesise, and evaluate. It appears that the instrument has a very significant role in the student's ability assessment process so that it requires careful and good planning to produce quality instruments and be on target (Bagnato, 2007; DeVries et al., 2002).

The planning and development of instruments aim to achieve optimal and reliable results that can be used as a reference for teachers in conducting the learning process. It also makes it easier for teachers to evaluate students' ability to recognize the concept of numbers according to their age range. Based on the background of the problems encountered, this research was conducted to develop an instrument of assessment of the ability to recognize the concept of numbers in Group A kindergarten children in Buleleng regency based on the theories developed previously.

Methods

Planning and development instruments introduce the concept of numbers in children group A kindergarten is carried out with RDR or Research, Development, and Research. This study's subject was a group A kindergarten student in Buleleng Regency and held in the even semester in Academic Year 2019/2020. The variables examined in this development research are instruments of ability to recognize the concept of numbers that need to strengthen the foundation on the mathematic learning by knowing the symbol, stating the object's number.

Data collection method conducted in this development research is questionnaire and interview with teachers of group A kindergarten. Questionnaires distributed to Group A teachers contain written statements so that teachers can respond following the conditions that occur in the field. Interviews are also conducted to confirm and obtain information based on experience during the learning process that has been carried out by the teacher.

Research with RDR model developed by Borg and Gall. RDR itself is divided into three stages, namely preliminary studies, development, and product effectiveness tests (Arikunto, 2013; Hanafi, 2017).. In the first stage, namely, preliminary study or research. Preliminary studies are conducted to get an overview of the problems in the field and observe the factors that influence the onset of the crisis. In this study, preliminary studies were conducted by collecting data in the form of teacher statements and observation results on the learning process.

The second stage is the development stage at the stage of development performed designing instrument. Instruments are measuring devices used to measure the learning process's evaluation activities. In this process, the first step is to design a grid of assessment and preparation of non-test evaluation questionnaires. Indicator development is developed based on the established dimensions. There are five dimensions, including mentioning, connecting, distinguishing, sorting, and writing. Furthermore, specifications are carried out by designing assessment indicators based on predetermined grids. The instrument consists of 12 points of positive and negative statements based on introducing the concept of numbers to group A kindergarten in Buleleng Regency. There is an assessment for each item of the information for both positive and negative statements. The scores for positive statements include a score of 5 for always answers, a score of 4 for frequent answers, a score of 3 for an occasional answer, a score of 2 for a rare reply, and a score of 1 for an answer never.

Simultaneously, the scores for negative statements include a score of 1 for always answers, a score of 2 for frequent answers, a score of 3 for an occasional answer, a score of 4 for a rare reply, and 5 for an answer never.

In this second stage, assessing the ability to recognize numbers is adapted from Ahmad Susanto (Liwis, 2017; Setiawan, 2020). Indicators developed namely a) mentioning, b) note the sequence of numbers, c) identifying (know the concept of numbers with objects), d) connect or pair symbol of numbers with items up to 10, e) distinguish and make two things equal in number with the same portion. The development of these indicators aims to facilitate and increase children's spirit and motivation in following the learning, especially in knowing the concept of numbers. That way, the child will concentrate and more comfortable to learn and mention the number of objects listed following the development of ability in children aged 4 to 5 years. The adapted indicators are then developed into statement items in the questionnaire. There are two points of the statement in each hand mentioning, sorting, and writing down. In contrast, there are three points of view for each indicator connecting and distinguishing. So there are 12 points of the statement in the questionnaire about the instrument of assessment of the ability to recognize the concept of numbers.

The third stage is the effectiveness test of the instrument that has been made. Effectiveness test is carried out to test the device's feasibility before it is used as a measuring instrument in the learning process to recognize the concept of numbers. Product effectiveness test aims to obtain useful, efficient, and effective products after development. In the third stage involves experts or experts who are competent in their field (Retnawati, 2016; Yusup, 2018). The results obtained are continued by analyzing the validity and reliability of the instruments developed. Besides, in the third stage, improvement is carried out following the inputs and suggestions given by experts/experts after evaluating the instrument of assessing the ability to recognize the concept of numbers in children Group B kindergarten in Buleleng district. By combining the advice that has been given and repeated improvements, it will be produced instruments that are worthy of being used in the evaluation of learning.

Results and Discussion

Results

The assessment carried out on the instrument developed focuses on two aspects: the tool's reliability and validity. The final results show that the tools developed have high validity and reliability. The results were obtained in the development of instruments to assess the ability to recognize the concept of numbers in children of group A kindergarten in Buleleng Regency with a score on the validity test that showed a score of 0.91. The score obtained belongs to a very high category.

Validity test conducted in this study is content validity test. The validity of the content or the content's validity is focused on elements of measuring instruments or instruments developed (Yusup, 2018). In the validity test, experts assess the representation of statement items according to the dimensions that have been set. This is done by looking at the suitability of the contents of the statement with the variables examined. The validity test provides opportunities for experts to determine the instruments developed with the research's practicality and purpose.

The validity test results are based on assessments conducted by experts who are competent in their fields. Based on the validity test results, there is one irrelevant statement according to one expert. The first expert stated that the point of information on assessing the ability to recognize the concept of numbers in Group A children is relevant, and there is no need for revision. However, the second expert has a different opinion on the fourth point of the statement. The second expert stated that the item of the statement is irrelevant. So there are 13 items of relevant statements and 1 item of irrelevant statements.

Irrelevant statements, according to the second expert, are developed from connecting dimensions. Experts state that the statements listed are not yet appropriate and represent the indicators in the assessment instruments' grid. However, other statement items are following the dimensions developed as well as the hands designed.

Furthermore, it is continued with the results of reliability tests to assess the accuracy of an instrument. Based on the reliability test results that have been done, the product obtained is 0.81. The results of this reliability test can be categorized that the instrument developed has very high reliability. These results prove that the tools that have been designed can be ascertained accuracy to be used as a measuring instrument in the learning process. It is primarily used for the learning process of introducing the concept of numbers. Calculation of reliability test can be seen in the Table 1.

Table 1. Reliability Test Results of Number Concept Assessment Instrument for children of group A Kindergarten in Buleleng Regency

Statement Item Number	Experts		Number of Scores
	1	2	
$\sum pq$			0,5
N			12
St 2nd			2
r^{11}			0,81

Description:
pq : the proportion of the answer to the sum of p+q
N : many items
St^2 : standard deviation of the total score
r^{11} : reliability of test device

Based on Table 1, it can be described that the proportion on the item of the relevant and irrelevant statement is 0.5. The amount is derived from the number of relevant and irrelevant statements. The number of items tested validity is 12 points of statements consisting of positive and negative statements. Furthermore, the standard deviation shown in the table is 2. It is thus resulting in a reliability score of 0.81.

In the research of the development of ability assessment instruments to recognize numbers, the results showed very good categorized results. Testing validity and reliability are important components in designing quality instruments following the development of a tool. Validity itself means an accuracy of the content and format of a designed tool.

Discussion

The validity of an instrument is seen from the accuracy and suitability of the measuring instrument's function in performing its measuring function (Azwar, 1997; Bagnato, 2007). Less useful tools have low validity. It can be interpreted that a valid instrument has high validity (Arikunto, 2013; Snow & Van Hemel, 2008). Therefore, looking at the final results of the validity test that has been done, the instrument of assessment of the concept of number recognition for children of Group A Kindergarten in Buleleng Regency can be used following its function.

After obtaining validity results that fall into the criteria is very high. The results indicate the same effects on the reliability test. An instrument can be declared accurate if the results obtained are the same after testing the same subject (Kagihara et al., 2009; Lidz, 2002). This is strengthened by Arifin who stated that a measuring device or instrument could

be trusted if it produces the same results when used to measure the same group with different periods (Arifin, 1991)

The results of reliability tests in this study are supported by (Arikunto, 2013; Basford & Bath, 2014) states that an instrument is said to have very high reliability if it can provide the right results. The instrument's reliability could be declared good if it can give the same results if used in different periods (Candiasa, 2010; Hani, 2019). This is in line with the findings in this study where the instrument of assessing the ability to recognize numbers can be used under its function by providing relatively the same results.

The instrument of assessing the ability to recognize the concept of knowing numbers in group A children is an evaluation tool that teachers can use to assess students' abilities in the learning process, especially mathematics learning. This relates to students' ability to mention, connect, distinguish, sort, and write numbers as the basis for math learning. Developed instruments can provide students with accurate assessments based on their cognitive abilities.

Based on the validity and reliability tests that have been done, the instruments that have been developed can be used following their functions to assess the ability to recognize the concept of numbers for children of Group A kindergarten in Buleleng Regency. According to Alam et al., (2019), validity and reliability are the instrument's main requirements can be said to be a good measuring instrument. The assessment instruments that have been developed with the results already meet the main needs as a good measuring instrument and worth using.

The results in this study have the same effects as some previous studies that have been done. The first research was conducted by (Aini, 2016) on developing language development assessment instruments for children 5-6 years old. This research aims to refer to teachers in evaluating the development of children's language at that age. The final score indicates this on the validity test and reliability test. The validity tests and reliability tests prove that the instruments of assessing children's language development -there are ages 5-6 years are categorized very high to be used as a measuring instrument in the learning process.

The second research supports the research conducted by (Gunartha et al., 2019) on developing assessment instruments for early childhood development or PAUD. The results prove that the tools that have been developed are the instrument that has good quality. Instruments that have been developed have been tested for validity and reliability to get maximum results following research.

The development of ability assessment instruments to recognize the concept of numbers in children of group A kindergarten in Buleleng regency is expected to help students follow the learning process and become active in every learning process. Besides, teachers can use this instrument as a measuring instrument during the learning process, especially when learning about the concept of numbers. As well as this assessment instrument can motivate students to learn to know the idea of numbers

Conclusion

Based on the research results on the development of instrument assessment ability to know the concept of numbers, the instrument that has been designed has a good quality by paying attention to the rules in the manufacture of a measuring device. A good instrument has good validity and reliability so that it can be useful for the learning process. The instruments that have been developed can be used as a way to measure students' ability to recognize the concept of numbers in group A kindergarten in Buleleng Regency, based on the study's conclusions, several suggestions are given following the observations and follow-ups carried out. The advice given to improve the quality of research and the results of this research is that teachers' attention should be thorough and allow children to be more active in learning. This

aims to motivate and train children's critical thinking in solving problems in everyday life. Second, teachers can use instrument assessments that have qualified validity and reliability to achieve learning objectives. With this assessment instrument, the teacher's evaluation will be more directed and following the child's ability and development. In other words, the assessment done will hit the target. Teachers will become more motivated in pouring creativity into learning to increase children's interest in learning mathematics. Lastly, the advice is given to the next researcher to develop and expand the research scope into developing research instruments related to recognising the concept of children's number A kindergarten. Researchers can then use the current research as a reference or source of information related to research on the same topic.

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