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Development of a learning disabilities test: a case study at elementary school

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Abstract

This study aims to determine the procedure and to assess the quality of the development of test instruments in measuring the learning disabilities of elementary school students. Learning disabilities are formulated as disorders that occur in learning activities such as dyslexia, dysgraphia, dyscalculia. The type of the research is research and development by using Martini Jamaris's Model. The subjects were 90 students of elementary school in Jakarta. The number of items was 75 items consisting of 19 items (dyslexia), 29 items (dysgraphia), and 27 items (dyscalculia). The results obtained in the validity test were declared valid were only 54 of the 75 items. Reliability of the test was stated to be reliable with very high interpretation in all dimensions. The results of the analysis of learning disabilities using a learning disabilities test that have been developed were obtained 90% of students experience learning disabilities.

Keywords: Test instruments, learning disabilities, learning disabilities test, elementary school

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Introduction

School is where children spend most of their time besides being at home. Children experience many things and problems that can occur at school. One of the problems that many children experience in school is learning problems. Learning problems are a problem found in school-age children (Gephart 2019; Ifdil et al. 2020) Schools have several demands on children that must be met. If the child was not able to fulfill it, the child will experience difficulties in the learning process at school which was called learning disability (Maehler and Schuchardt 2016).

Learning disabilities is a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations (Abdurrahman 2012; Allen and Schwartz 2001; Deiner 2013; Harwell and Jackson 2008; Kirk et al. 2009; Mangunsong 2014; Pesova, Sivevska, and Runceva 2014; Sidiarto 2007; Smith et al. 2008). Learning disabilities is a neurological disorder that affects the brain's ability to process, store, and respond to information, thus causing difficulties in the academic field, especially in reading (dyslexia), writing (dysgraphia), and counting (dyscalculia) (Juntorn, Sriphetcharawut, and Munkhetvit 2017; Leong, Carter, and Stephenson 2015; N Young and Furgal 2016).

Learning disabilities are often present early and continue throughout the lifespan, with a change in severity at different stages (N Young and Furgal 2016). The first signs of learning disabilities appear as

early as in the kindergarten. But identification is rarely performed the end of the kindergarten, or before the first grade (Pesova et al. 2014). Learning disabilities usually cannot be identified until the child has failed in completing academic tasks that must be done (Klein, Cook, and Richardson-Gibson 2001). Syndrome of learning disabilities are generally confirmed in the course of elementary school (Pesova et al. 2014).

Overall, school-aged children who experience learning disabilities have varying incidence. In developed countries such as the United States and Europe the incidence of learning disabilities is approximately 10-15% of the school population. The incidence in boys is more than in girls at 8: 1 (Chodijah 2014). As quoted from data from the United States Department of Education in 2014, which said that 35.4% of the population of the United States of school age had learning disabilities. Learning disabilities are the biggest problems encountered in the United States from thirteen problems found in schools (Heward, Alber-Morgan, and Konrad 2017). In Indonesia, there are several studies on the existence of children with learning disabilities, among others, research conducted by Nafsiah Ibrahim on 3,215 first to sixth grade elementary school students in DKI Jakarta. The results of the study showed that there were 16.52% which were estimated by the teacher as students who included learning disabilities (Abdurrahman 2012).

Learning disabilities are a disorder that makes it difficult for a person to carry out learning activities effectively (Jamaris 2014). Learning disabilities experienced by children will affect the learning process and can be found in children who have problems hearing, thinking, or speaking; in school-age children. Learning disabilities become more evident when children experience difficulties in reading, writing, and mathematics. Learning disabilities show to failures in academic achievement that are in accordance with the expected capacity. These failures include mastery of reading skills (dyslexia), writing skills (dysgraphia), and / or mathematics skills (dyscalculia) (Essa 2014).

Learning may be difficult if these students are not identified and managed appropriately (N Young and Furgal 2016). School aged children with learning disabilities present unique challenges and opportunities for school professionals (Abdurrahman 2012; N Young and Furgal 2016). One that can be done by the teacher to students who have learning disabilities is to identify as early as possible (N Young and Furgal 2016). So the teacher needs training on how to identify symptoms that exist in students who experience learning disabilities.

In fact, the identification of symptoms of learning disabilities carried out by the teacher to students cannot yet be done because there is no development of a learning disabilities test in elementary school students. The development of a learning disabilities test has now been carried out by Smith. Smith developed a learning disabilities test for adults (Smith 1997). Development of a learning disabilities test for children has also been carried out but does not focus on learning problems in elementary school students (Aro, TuijaAhonen 2011). Finally, the researcher developed a learning disabilities test for elementary school students that could be done by the teacher. The tool kit a learning disabilities test is designed as easily as possible so that the teacher can easily carry out the examination until the interpretation process. In the future, the development of a learning disabilities test developed by researchers based on computerized application because now the answer sheets of a learning disabilities test are in the form of computer answer sheets so that the teacher is easier in the process of analyzing data and interpretation. So that, this study aims to determine the procedure and assess the quality of development of test instruments in measuring the learning disabilities in elementary school students.

Method

This type of study was research and development (R & D). Gall, Borg and Gall (Gall, Gall, and Borg 2003) and Dick and Carey (Dick, Carey, and Carey 2015), stated seven steps in conducting research and development as followed : (1) research analysis and need assessment/ proof of concepts; (2) product planning and design; (3) product development; (4) preliminary field test; (5) product revision; (6) main field test, (7) final product (Gooch 2012). Thiagarajanan stated about the concept of developing learning is called four D Models which consists of several stages, namely : (1) define, (2) design, (3) develop, (4) disseminate (Mulyatiningsih 2011). The two research and development models were eventually modified to become Martini Jamaris's Research and Development Model, as shown in the following figure.

Stage 9	**IMPLEMENT/DISSEMINATE**
Stage 8	**DESIGN AND DEVELOP** Final Revision
Stage 7	Field Test 2
Stage 6	Model Revision 2
Stage 5	Field Test 1
Stage 4	Model Revision 1
Stage 3	Model Evaluation can involve expert judgement
Stage 2	Develop Model Design
Stage 1	**DEFINE** Collect information: Research analysis, Need Assessment or Proof of Concept or Literature Study

Figure 1. Martini Jamaris's Research & Development Model

Based on the figure 1, it can be concluded that the research and development methods used to construct the three dimensions of learning disabilities consisted of nine stages. The nine stages in the process of making test instruments were divided into three steps of activity. The three steps of activity in developing a test instrument was define, design and develop, and implement/disseminate (Jamaris and Edwita 2014).

This research took place from October 2017 - August 2018 in elementary schools in DKI Jakarta. The research subjects of development a learning disabilities test as many as 90 students consisted of 30 students from elementary school A, 30 students from elementary school B, and 30 students elementary school C.

Data analysis of validity and reliability test used SPSS program ver. 21. Content validity test used the content validity coefficient - Aiken's V. The content validity coefficient - Aiken's V was based on the results of an expert panel evaluation of (n) people on an item from the extent to which the item represents the construct measured (Aiken and Groth-Marnat 2005). Assessment was done by giving a number between 1 and 5 in seeing the relevance of the indicators of each item (Mora, JNC; Silva, FB; Lopez, RR; Cortez 2016). The construct validity proves whether the measurement results obtained through test items correlated highly with the theoretical constructs underlying the preparation of the test. Construct validity test was done by using item-total correlation. Reliability test was carried out using alpha Cronbach (Taherdoost 2016). The research data set can be accessed in osf.io/r98ay open science framework (Aziz n.d.).

Results and Discussions

The results of the research that will be discussed are related to the ongoing research development procedures and the value of the quality of the development of a learning disabilities test to knowing the learning disabilities in elementary school students.

Development of Instruments Procedure

The development of test instruments to determine the learning disabilities experienced by elementary school students has gone through a series of development stages from defining concepts, designing and developing a test instruments, to implementation/dissemination stages to produce a test instruments product (Jamaris and Edwita 2014). The stage of defining the concept was the initial or preliminary stage of the process of development a test instruments. At this stage the researcher collecting information, doing research analysis, doing need assessment to prove the theory obtained from literature studies to measure the inability of elementary school students in reading skills (dyslexia), writing (dysgraphia), and numeracy/mathematics (dyscalculia) and determining place of field trial. The next stage was the design and development stage. At this stage the researcher developed a design model instrument to find out the learning disabilities in elementary school students in the form of grids, questions test, guides test, draft media test instrument kits, and draft answer sheets. After that, the three experts were experts in

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the fields of education, developmental psychology, and educational psychology. The results of the expert judgment were revised which were then tested in the field to obtain validity and reliability instruments. The field trial stage was conducted on the research subjects, namely students of grade 1st - 3rd in the three elementary schools located in DKI Jakarta. The last of these stages is the dissemination stage carried out on 10 teachers, 3 students, 1 therapist in the form of training and conducting a learning difficulties test for 81 students of grade 1st – 2nd in both elementary schools located in DKI Jakarta.

Quality of Instruments

The results of the content validity test on a learning disabilities test used the Content Validity - Aiken's V Coefficient in each dimension both dyslexia, dysgraphia, and dyscalculia obtained from the experts judgement is a validity coefficient value of 0.99 - 1.00. The validity coefficient value which is close to 0.70 has a high classification.(Mora, JNC; Silva, FB; Lopez, RR; Cortez 2016). So that the content validity of a learning disabilities test which almost reached 1.00 can be called excellent.

The results of the construct validity test used total item correlation were declared valid only 54 of the 75 item questions. The results of the item validity test on the dimensions of dyslexia had 16 valid items from 19 items with the acquisition of the validity coefficient value 0.48 - 0.78. Items that obtain validity coefficient values above 0.40 can be declared valid (Post 2016). Items that were declared valid were item no. 1, 3 - 17. So items no. 1, and 3-17 can be said to really describe the dimensions of dyslexia to be measured. The results of the item validity test on the dimensions of dysgraphia had 20 valid items from 29 items with the acquisition of the validity coefficient value 0,40 – 0,66. Items that obtain validity coefficient values above 0.40 can be declared valid (Post 2016). Items that were declared valid were item no. 20, 22 – 37, 39, 41. So items no. 20, 22 – 37, 39,41 can be said to really describe the dimensions of dysgraphia to be measured. The results of the item validity test on the dimensions of dyscalculia had 18 valid items from 27 items with the acquisition of the validity coefficient value 0.41 – 0.64. Items that obtain validity coefficient values above 0.40 can be declared valid (Post 2016). Items that were declared valid were item no. 54 - 56, 60, dan 62 – 75. So items no. 54 - 56, 60, dan 62 -75 can be said to really describe the dimensions of dyscalculia to be measured.

The results of reliability test on a learning disabilities test used alpha Cronbach in each dimension both dyslexia, dysgraphia, and dyscalculia obtained a reliability coefficient of 0.88 - 0.91. The classification of dyslexia dimensions was excellent because the value of reliability was above 0.91. While the classification of dysgraphia and dyscalculia dimensions is high because the reliability coefficient is 0.90 and below (Taherdoost 2016).

Seeing the results of good validity and reliability, a learning disabilities test developed can already be used by the teacher. A learning disabilities test that will be used by the teacher to find out about learning disabilities that occur in their students.

Conclusions

The results of the research have a significant contribution to the test instruments that have been developed because the test instruments can determine the symptoms of learning disabilities experienced by elementary school students accurately. The test instruments developed were carried out carefully because during the development of the test instruments involved experts and were followed by trial instruments that showed significant validity and reliability. The instruments test needed by elementary school teacher as well as the related parties. Therefore, a learning disabilities test can be used by the teacher even though they still have to go through training.

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