CHAPTER 1
THE PROBLEM

This chapter discusses the rationale of this research, theoretical framework, conceptual framework, problem identification, hypotheses, assumption, scope of work and delimitation, as well as the importance of study. The rationale explains the background of this study and the related problem situation. Theories and concepts which are used to conceptualize this study are discussed in theoretical framework, while variables related to our problem as well as their relationship to the paradigm of this study are discussed in conceptual framework. The identified problem within this study is explained in problem identification. The hypotheses discusses the proposed approach for solving the problem. The Assumption describes the limitation of input, while scope of work and delimitation describes the limitation of the output. Finally, the contributions of this study are described in importance of study.

1.1 Rationale

Dyslexia is a specific learning difficulty in language areas such as the language used for oral, written and social communication. Dyslexia causes difficulties in reading, writing, spelling and organization. Therefore dyslexia causes difficulty in reading, further it will affect not only academic success but also self-esteem and social-emotional development. Dyslexia cannot be cured, but the impact can be reduced and it can be identified at the age of 5 years old (preschool) [1]. For identifying dyslexia, an expert like children neurologist is necessary. The processes that have to be done by the expert to diagnose dyslexia are as follows:

1. Experts collect information about the child's background, family background, academic and non academic experiences at school and home.
2. Experts give the child's parents a recommendation to examine the child's IQ, visual, and hearing ability.
3. Experts observe the the child condition by assessing the child's academic and non academic ability.

4. After analyzing the observation results, experts will decide the severity level of dyslexia.

The whole processes are conducted by face to face examination. Since Indonesia is an archipelago and consists of thousand islands, and the number of experts is not sufficient for handling the children who live in rural area, so a way to facilitate Indonesian children for observing them without face to face examination is necessary. Early identification will provide great benefits such as: observation cost efficiency, and more flexible observation process.

Nowadays, there are some research and invention in other countries such as Reitano [2] who proposed dyslexia identification system using handwriting recognition. Furthermore, Frank and Levinson [3] proposed dyslexia identification system using eye movement detection. Nevertheless, these studies did not check other aspects such as academic and non-academic ability as well as parents background.

Another approach in the dyslexia identification has been proposed by Fawcett and Nicolson [4]. Fawcett and Nicolson proposed Dyslexia Early Screening Test (DEST). DEST is a test for dyslexia early identification that has the ability to assess, scoring, and interpreting the result. DEST tested by teacher and professionals is for preschool age children in the United Kingdom. DEST consists of several tests that assess children's ability such as speed, motor skill, phonological skills, memory capacity, cerebellar function and reading knowledge. This test cannot directly be used in Indonesia because it uses English which is different in some phonemic pronunciation, reading and writing words. Furthermore, DEST uses English for describing the screening result which is not all Indonesian people can understand it.

Based on the problem of the previous method that proposed by [4], it can be concluded that Indonesian Dyslexia Early Identification system is necessary for facilitating Indonesian community especially in the rural area.

1.2 Theoretical Framework

Fawcett and Nicolson proposed Dyslexia Early Screening Test (DEST) for identifying 5-7 years old children at risk for dyslexia. DEST is computer-based test that has the ability to assess, score, and generate screening report. There are several tests tested in DEST such as speed, motor skills, phonological skills, memory capacity, cerebellar function and reading knowledge. The tests is administered by teachers or professional [4].

DEST cannot be directly be used in Indonesia because of the difference in language and culture as mentioned in rationale. To overcome DEST problem, building dyslexia early identification system that match with Indonesian language and culture is necessary. This study is to develop the instrument for identifying whether the child has a risk of dyslexia in Indonesian language and generating screening report in Indonesian language.

1.3 Conceptual Framework

The basic concept of the proposed method is building dyslexia early identification system for Indonesian people. For achieving the objective result, there are several variables are involved in this study. The inputs of dyslexia identification system are the answers of the questionnaire and corpus of dyslexia screening report. The outputs of dyslexia identification system are identification result and screening report. Thus, the dependent variables are the the accuracy of identification and the naturalness of generated sentences and the independent variable is the validity of instrument, experts rule, and corpus of dyslexia screening report. The accuracy of identification is influenced by the validity of the instrument and expert rules, while the naturalness of generated sentences is influenced by the validity of the dyslexia screening corpus.

1.4 Problem Statement

Based on the background of this research discussed in Section 1.1, until 2016, there is no dyslexia early identification system that can be easily accessed anywhere and anytime to identify children at risk for dyslexia that based on Indonesian language and culture. DEST cannot be directly be used in Indonesia because of the differences in language and culture. From the perspective of the language, there are differences in some phonemic pronunciation, reading, and writing words that will be used in the questionnaire. Meanwhile, from the perspective of the culture, there are differences in the questionnaire and scoring method. Furthermore, DEST uses English for describing the screening report which is not all Indonesian people can understand it. There are differences in grammar and sentences structure.

1.5 Hypotheses

The objective of this research is, building dyslexia early identification system for Indonesian children. It is to identify whether a child has risk of dyslexia or not.

To solve DEST problem, this study propose dyslexia early identification system (DEIS) that consists of main screening and deep screening. The main screening identifies whether the children have a risk of dyslexia or not, whereas the deep screening determines the severity level of dyslexia. The main and deep screening use the questionnaire and scoring method that in-line with Indonesian language and culture. This study also generates screening report based on grammar and sentence structure that is used by the experts in Indonesia. This study uses Natural Language Generation (NLG) for generating the screening report because the parents often confuse if the result is only shown in a form of scoring table.

The report generation for the main screening adopts semi template based NLG, because the structure of the sentences is not complex. Meanwhile, the deep screening report requires more sophisticated techniques with statistical based NLG, because the structure of the sentences is more complex than main screening report. The contribution of this study is the method for generating rule from the experts for data processing and report generation.

The proposed method is expected to be able to overcome the problem, because it has the ability to identify the children at risk for dyslexia and generate report that is in line with Indonesian language and culture.

1.6 Assumption

This study assumes that the inputs to the proposed system are as follows:

1. The age of children who are examined is 5 - 7 years old (preschool age).
2. Main screening inputs are questionnaire answers filled by parents based on their children condition and the answers are assumed as valid answers.
3. The aspects examined in the main screening are as follows: children and parents backgrounds, academic and non-academic abilities. The academic abilities consist of the language used for oral, written and social communication. The non-academic abilities consist of sequences and direction identification, capacity of working memory, and organization ability.
4. The deep screening inputs are the questionnaire answers filled by certified counselor based on observation and the answers are assumed as valid answers.
5. The aspects examined in the deep screening are academic and non-academic ability. The academic ability consists of the language used for oral, written and social

communication. Non-academic ability consists of sequence identification, working memory capacity, organization and ne motor coordination ability.

6. The input for report generation is the corpus of screening report written by experts. The corpus is assumed as a valid corpus.

1.7 Scope and Delimitation

This research formulated the scope and delimitation are as follows:

1. The system is dedicated for Indonesian.
2. The output of main screening process is main screening report in Indonesia language. Main screening report consists of scoring, brief description about screening result (dyslexia risk or not), and recommendation for further examination.
3. Main screening report will be read by parents and experts.
4. The output of deep screening process is deep screening report. Deep screening report consists of scoring, detail description about severity level of dyslexia (mild, moderate, or severe), indicator analysis, recommendation for professional assessment and type of therapy that is necessary.
5. Deep screening report will be read by expert.
6. This proposed system is on-line system such that it can be easily accessed anywhere and anytime.

1.8 Importance of Study

This study contributes to help Indonesian parents earlier identifying dyslexia whether their children have a risk of dyslexia or not. Furthermore, this proposed system can facilitate all Indonesian people for detecting whether their child has a risk of dyslexia or not, as soon as possible without face to face examination.