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SMART READING MODULE ON READING FLUENCY OF JUNIOR SECONDARY CHILDREN WITH READING DIFFICULTIES IN SRI LANKA



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NAINA MOHAMED MOHAMED SAFEER

SULTAN IDRIS EDUCATION UNIVERSITY

2024



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DOCTOR OF PHILOSOPHY

FACULTY OF HUMAN DEVELOPMENT
SULTAN IDRIS EDUCATION UNIVERSITY

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APPRECIATION

Alhamdulillah. I am deeply grateful to complete my doctoral journey with cherished memories, and I attribute this achievement to the unwavering support I received from various individuals and institutions, particularly Sultan Idris Education University.

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ABSTRACT

This study aims to measure the effects of the Smart Reading Module (SRM) on the reading fluency of junior secondary children with reading difficulties. Objectives are to identify the module needs, to measure the improvement in reading fluency after using SRM, to assess the variation in decoding and linguistic comprehension skills between the pre-test and post-tests of the experimental group, and to measure the effect of SRM-based teaching intervention in improving the reading fluency of junior secondary children with reading difficulties in Sri Lanka. This study used a need analysis survey of 164 junior secondary teachers to identify the need for module-based teaching intervention and a 10-week quasi-experiment with 60 junior secondary children with reading difficulties. The Smart Reading Module-based intervention included a teacher guide, students' exercise books, students, and a teacher survey. Survey data was analyzed using descriptive statistics and Intervention data was analyzed with t-tests. Findings of Paired sample t-tests showed significant improvement in decoding and linguistic comprehension skills within the experimental group (pre-test $M=39.80$, $SD=13.58$; post-test $M=60.63$, $SD=15.38$, $t(29) = 10.84$, $p = .001$). This suggests that targeted interventions effectively enhance reading skills in junior secondary children with reading difficulties. Moreover, an independent t-test (One-tailed) revealed significantly higher post-test scores in the experimental group compared to the comparison group. In conclusion, the Smart Reading Module-based teaching intervention effectively enhanced the reading fluency of junior secondary children with reading difficulties, yielding a more substantial effect compared to conventional classroom-based teaching. This study offers a clear direction to the Ministry of Education for crafting policies that prioritize the development of reading skills, particularly in linguistic contexts like the Tamil language in Sri Lanka.



SMART READING MODULE TERHADAP KELANCARAN MEMBACA MURID MENENGAH RENDAH DENGAN KESUKARAN MEMBACA DI SRI LANKA

ABSTRAK

Kajian ini bertujuan untuk mengukur keberkesanan Smart Reading Module (SRM) terhadap kelancaran membaca murid-murid yang lemah dalam kemahiran membaca. Objektif kajian ini adalah untuk mengenal pasti kepentingan modul, untuk mengukur penambahbaikan kelancaran membaca selepas menggunakan SRM, untuk menguji variasi dalam penyahkodan dan kemahiran pemahaman linguistik antara ujian pra dan ujian pasca kumpulan eksperimen dan untuk mengukur kesan intervensi pengajaran berasaskan SRM dalam meningkatkan kelancaran membaca murid-murid menengah rendah yang lemah dalam kemahiran membaca di Sri Lanka. Kajian tinjauan melibatkan 164 tenaga pengajar murid-murid menengah rendah untuk mengenal pasti keperluan intervensi pengajaran berasaskan modul dan eksperimen kuasi selama 10 minggu dengan 60 orang murid yang lemah dalam kemahiran membaca. Intervensi Smart Reading Module-based telah merangkumi bimbingan guru, buku latihan murid-murid, murid-murid dan kajian tinjauan guru-guru. Data tinjauan dianalisis menggunakan pelbagai kaedah statistik diskriptif dan data intervensi telah dianalisis menggunakan t-test. T-test sampel berpasangan menunjukkan peningkatan yang ketara dalam kemahiran penyahkodan dan pemahaman linguistik dalam kumpulan eksperimen (ujian pra $M=39.80$, $SD=13.58$; ujian pasca $M=60.63$, $SD=15.38$, $t(29) = 10.84$, $p = .001$). Perkara ini menunjukkan bahawa intervensi yang disasarkan secara berkesan meningkatkan kemahiran membaca dalam kalangan murid menengah rendah yang lemah dalam kemahiran membaca. Tambahan pula, t-test bebas (One-tailed) menunjukkan markah ujian pasca kumpulan eksperimental yang lebih tinggi secara ketara berbanding kumpulan perbandingan. Secara kesimpulannya, intervensi pengajaran berasaskan modul berkesan meningkatkan kelancaran membaca murid-murid menengah rendah yang mempunyai masalah membaca, menghasilkan kesan yang lebih besar berbanding pengajaran berasaskan bilik darjah konvensional. Implikasi kajian menunjukkan hala tuju yang jelas untuk merangka dasar oleh Kementerian Pendidikan yang mengutamakan pembangunan kemahiran membaca, khususnya dalam konteks linguistik seperti bahasa Tamil di Sri Lanka.



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LIST OF ABBREVIATIONS

DE	Department of Education
G.C.E. (A/L)	General Certificate Advanced Level
G.C.E. (O/L)	General Certificate Ordinary Level exams
IQ	Intelligence Quotient
NEREC	National Education Research and Evaluation Centre
SRM	Smart Reading Module
SVR	Simple View of Reading

APPENDIX LIST

- A** Teacher's guide
- B** Students exercise book
- C** Original questionnaire
- D** Authorizing to adopt of the questionnaire
- E** Survey questionnaire for teachers
- F** Changes made to the original questionnaire.
- G** Pre-test and post-test questionnaire.
- H** Student's feedback factorial survey questionnaire
- I** Intervention teacher's survey
- J** Cover letter for face validity checklist
- K** Face validity checklist
- L** Cover letter for content validation rating scale
- M** Content validation rating scale
- N** Covering letter for content validation rating scale for teacher guide and students' exercise book.
- O** Content validation rating scale for teacher guide and students' exercise book.
- P** Content validation rating scale for pre-and post-test
- Q** Informed consent form

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter presents the introduction to the study. This chapter is organized as the background of the study, statement of the problem, purposes of the study, research questions, hypotheses, theoretical and conceptual frameworks, the significance of the study, limitations of the study, operational definition, and summary.

1.2. Research Background

Sri Lanka is a South Asian country consisting of a 21.6 Million population with a 92.5 percent literacy rate. Free education is provided from primary to higher education to ensure the sustainable development goal (Central Bank of Sri Lanka, 2020). Sri Lanka spends more time in the education system than its neighbors in South Asia. Since the free and compulsory educational policies were implemented the enrolment rate to primary grade is 99% and completion is also ensured (Dundar et al., 2017). Expanded access to access to education, especially for primary and junior secondary education in

Sri Lanka also helped to achieve impressive literacy and nearly universal enrolment rates (Sarma, Licht & Kalugalagedera, 2018).

Sri Lanka expects to achieve sustainable development goals through the bills and policies. The policies and bills mainly focus to ensure educational development. The free education bill was passed in 1944 to provide free education to the public without any discrimination. Free education is provided not only the education for free of charge but also to ensure equity in education. The free textbooks, free uniforms, free shoes, and free meals programs are carried out to impact positively reduce students' absenteeism and are a great relief for the poor parents (Alawattegama, 2020).

Inclusive education policies are set to equal access to education at all levels to provide equal opportunities in education for all children. Following the universal agreement on inclusive education, Sri Lanka took steps to adopt the concept of inclusive education and prepared related national education policies (Furuta & Alwis, 2020)

Moreover, the curriculum changes were carried out eventually to fulfill the current needs and upgrade the educational achievements to overcome future challenges. Sri Lanka has implemented numerous curriculum adjustments aimed at enhancing the quality of primary and secondary education. These changes are geared towards ensuring academic achievements that align with global standards (National Education Commission, 2019).

Numerous studies on the Sri Lankan education system found several critical issues in educational settings. Several studies criticize that learning outcomes in Sri



Lanka do not meet international standards. Sri Lanka has a net enrolment rate for primary education is 99 percent (The World Bank, 2021). However, 82.1% of students complete their secondary education and nearly 17.9% of them drop from school (UNESCO, 2019). According to Abayasekara, and Arunatilake (2018), Sri Lanka's public education system suffers from poor examination outcomes and wide disparities in academic achievement across schools.

The Grade 5 Scholarship examination results, National level General Certificate Ordinary Level (G.C.E. O/L) exams, and General Certificate Advanced Level (G.C.E. A/L) exam results also reveal the problems in education in Sri Lanka. 21.9% of students obtained below 35 marks in the Grade Five Scholarship Examinations 2019. Moreover, 62.42% of students passed in 6 or more subjects (including 1st Language & Mathematics) with 3 credits, and 37.58% of students failed in G.C.E. O/L in 2019. Moreover, 2.52% of students failed in all subjects. In G.C.E. A/L 64.39% of students passed 3 Subjects (eligible for university entrance) and 8.69% of students failed in all subjects (Department of Examination, 2021). Since the Sri Lankan education system is highly exam-oriented, parents, teachers, principals, and education officers play a major role in preparing children for examinations, often pressurizing them towards better performances. The education system also appears to be designed to reward high-mark scores and tends to neglect low achievers in the teaching and learning process (Priyadarshani & Samudra, 2021).

Even the special needs educational policies and the right-to-education policies introduced in Sri Lanka to ensure inclusive practices for children with disabilities, there is a disparity between policy and practice in Sri Lanka. There is no evidence of a strong



coordination mechanism within and among ministries concerned with disability-inclusive education (Grimes & Cruz, 2021). Despite free education mandates in Sri Lankan education policy since 1948, most Sri Lankan schools lack realistically accessible standards and adequately trained teachers to support the needs of students with disabilities, due to the unequal distribution of resources (Nanayakkara, 2022).

Reading is a natural process. Everyone can learn to read throughout life in various contexts. We read people, situations, feelings, and printed text and understand the meaning with help of our previous experiences. However, most of the time we focus only on printed text-based reading. Reading text is not harder than reading faces or situations. Thus, children can read the text and sense the world.

Reading is integral to learning, both as a student and as a lifelong learner. Early reading skills are strongly associated with later academic achievement, including high school and post-secondary completion (Southern Regional Education Board, 2018). Reading literacy plays an important role in people's daily lives (Britt, Rouet, Durik & Jean-François, 2018). Reading competencies represent a key factor for educational and professional success, lifelong learning, and social participation (Schröter & Bar-Kochva, 2019). Reading difficulties have an effect on people's development as individuals, societies, and countries depend on reading for survival (Khatib & Bar-Kochva, 2018). Skilled readers can derive meaning from text both accurately and efficiently (Petscher, Solari & Catts, 2019). The process of reading comprehension is intricate and requires a range of linguistic and cognitive abilities (Nation, 2019). Therefore, deficiencies in any cognitive function that is crucial to the comprehension process may result in deficiencies in the performance of reading comprehension

(Schiffman, 1998). Children with poor reading struggle to drive meaning from text (Spencer & Wagner, 2018).

The poor readers appear to lack reading accuracy, lack of reading fluency, lack of reading comprehension, and many different combinations (Oakhill, Cain & Elbro, 2019). Poor readers tend to produce a higher number of reading errors as well as have similar difficulties with reading prosody (Ceylan & Baydik, 2018). If a child is exposed to clinical features of dyslexia across the developmental span, it should be treated in clinical settings (Kim, 2021). However, this study focuses on a mild and moderate level of children with reading difficulties, which is students with a mixed reading difficulties profile (garden variety poor readers) are those who show weaknesses across word recognition and language comprehension (Westerveld, Armstrong & Barton, 2020).

Early identification and intervention are essential to minimize the impact of a reading disability (Colenbrander, Ricketts & Breadmore, 2018; Poulsen, Nielsen, Juul & Elbro, 2017). Interventions to improve language skills at school entry could have important, and quite broad, effects on children's later educational development and wellbeing (West et al., 2021). When students are experiencing difficulty learning to read and write, early intervention is critical. If interventions are implemented in early schooling, expert teaching often can dramatically change the trajectory of students' learning (Kaye, Lozada & Briggs, 2022). The disability can be controlled and taken care of if identified earlier. This difficulty can be solved with the help of school teachers (George, Hemadharshini, Malaidevan, Britto & George, 2020).



In this context, Sri Lanka does not have a national-level program for the identification and management of poor readers. Minimum attention is paid to specific learning disorders like dyslexia (Hettiarachchi, 2021). Thus, the students who have special needs are not well treated by the teachers as well as the school management (Kasturiarachchi, 2020).

Children with special needs were neglected because of ignorance, according to studies on inclusive education for all students in Sri Lanka. Slow learners are primarily identified by late identification and ignorance of children with reading difficulties, with 97% of teacher trainers and 94% of teachers lacking a clear understanding of what dyslexia is (Indrarathne, 2019). Poor reading skills have caused 87.38 percent of students to receive scores below the 40-point cut off in the Trends in International Mathematics and Science Study (TIMSS), according to island-based patterns in achievement (NEREC, 2016). Studies recommend paying attention to policy and practices in Sri Lanka. Especially formulate a screening tool translating and validating in Sinhala and Tamil, early identification and treatment, and awareness programs for healthcare workers and teachers (Hettiaarachi, Ranaweera, Walisundara, Daston-Attanayake & Das, 2018).

Studies based on special education also revealed the dire performance in special education in Sri Lankan school education. Peries, Indrarathne, Jayamanne, Wickramasekara, Alwis, and Jayatilleke's (2021) study, the preparedness of primary school teachers to diagnose dyslexic children was examined. It was discovered that over 50% of the participants lacked sufficient knowledge of the methods and resources available to diagnose dyslexia in their particular setting. However, they have exposed





positive attitudes towards engaging in identifying dyslexia. Heavy workloads make the teachers unbalancing in dealing with students with special needs. Three-quarters of teachers in the study faced difficulties in teaching students with special needs (Furuta & Alwis, 2017).

Although Sri Lanka has made a number of curriculum changes, a significant percentage of dropouts and underachievers continue to attend school. Abayasekara, and Arunatilake (2018) and Perera (2021) studies criticize the Sri Lankan education system, such as low participation and low attendance; low achievement in mathematics and science; imbalanced allocation of resources among schools, particularly between urban and rural schools; and an excessively large curriculum.



2004b, 2009, 2013, and 2015 based on the achievement of students completing grade four and 2006, 2012, 2014a, and 2016 based on achievement of students completing grade eight show approximately 50% of the student's performance was below 40 marks. Meanwhile, the analysis of cognitive skills of knowing, applying, and reasoning appears to be similar. These findings illustrate the lack of language abilities such as reading and writing at primary and secondary levels.

These studies illustrate the Sri Lankan education system, special education and inclusive educational practices, critical situation of children with reading difficulties, and the importance of appropriate intervention programs. While the Sri Lankan education system remains with a poor attainment rate and an exam-oriented curriculum



ushered in ignorance of children with special needs, especially, children with reading difficulties.

1.3 Problem Statement

The majority of children with arithmetic and comorbid fluency problems in Grade 3 were already identifiable at grade 1, whereas children with low reading fluency were reliably identified from the beginning of second grade (Pulkkinen et al., 2022). When a teacher teaches in a class, gifted, motivated, and average children learn quickly. However, children below average or slow learners struggle to learn and need assistance to achieve competency. When it continues, below-average or slow learners become children with reading difficulties (Miller, 2018).

Teaching reading is challenging because it is a multifaceted and complex task, and the resources used to do so come from various sources and concentrate on various facets and areas of educational practice (Hoover & Tunmer, 2020). Early intervention with appropriate teaching and assessment methods with tailored modules to accommodate these children's needs decreases their delays in learning and breaks their isolation (Serrano, 2019; Alja'am, Saleh, Massaro & Eid, 2018). The multisensory learning techniques help children with reading difficulties (Langille & Green, 2021), differentiated instruction and the facilitation of teaching instructions with guided practice in reading (Strogilos, Avramidis, Voulagka & Tragoulia, 2018) help children with reading difficulties.



Moreover, junior secondary Tamil children with reading difficulties often struggle with word recognition and decoding, leading to slower reading speeds and impacting overall fluency. They face challenges in comprehending text and spoken language, hindering their engagement and interpretation. Reading with proper expression and intonation is also difficult, indicating comprehension issues. Broader language development problems further affect their spoken and written language skills.

Tamil, an alphasyllabary, has a relatively opaque orthography compared to other Brahmi scripts. Reading Tamil is influenced by the need to master many visual symbols, including syllabographs for vowels, consonants, and vowel diacritics. Unlike English, where letter name-sound associations must be learned separately, Tamil's letter names and sounds are the same. Despite having fewer alphasyllabographs than other Brahmi scripts, Tamil's one-to-many letter-sound correspondences make learning challenging (Bhuvaneshwari & Padakannaya, 2013).

Alphabet learning is considered the most challenging part of language learning, as the Tamil alphabet system requires mastering 234 sounds within the first few months of class one. Following this, children learned to decipher words, often through rote memorization. At this stage, children struggled to comprehend words in their syntactic context and saw them as isolated units. The lack of contextual understanding made word recognition difficult (Geetha, 2012).

Tamil is a morphologically rich, agglutinating language with complex verb structures that serve key grammatical functions. Grammatical knowledge includes verb forms (finite, non-finite, infinitival), agreement inflection for person, number, and





gender, and argument structure with case relations. Additionally, auxiliary elements express tense, aspect, mood, negation, etc. Learners must handle the split properties of the subject and the case configurations determined by each verbal lexeme, making Tamil acquisition challenging (Sarma, 2013).

In this context, there is some attempt made with the digital-based or game-based intervention in special education targeting Sinhala and Tamil medium students in Sri Lanka. iLearnRW (a character-based game - a series of open-ended and re-playable sessions) and Jollymate (a self-learning digital notepad) were developed to assist children with dyslexia (Kandamarachchi & Abeykoon, 2021). However, this study missed to prove the effectiveness of the applications. Rupasinghe, Abeyweera, Pushpananda, and Weerasinghe (2020) designed a game-based learning model for children below eight years. Moreover, Kariyawasam, Nadeeshani, Hamid, Subasinghe, and Ratnayake (2019) attempted to clinical screen children with specific learning disabilities and provide treatments via a mobile game. But these studies were limited to children aged six and seven and the impact of these applications is not assured.

ATHWELA web-based application was developed with assistive technology to use in special education classrooms as a tool of gratification and extrinsic motivation for children with intellectual disabilities (Ninansala & Morawaka, 2019). The Hope therapy-based app helps dyslexic children with their speaking, writing, and reading abilities when used with a parent or guardian (Thelijjagoda, Chandrasiri, Hewathudalla, Ranasinghe & Wickramanayake, 2019). ARUNALU was developed to deliver, phonological support to enhance the reading skills of dyslexic children by providing a machine learning-based automated screening and intervention mobile solution





(Sandathara, Tissera, Sathsarani, Hapuarachchi & Thelijjagoda, 2020). These applications are available in Sinhala language and someone is needed to assist the children.

Moreover, Kanapathy (2019) developed a phonological game-based module to enhance the Tamil school Linus program in Malaysia. However, the phonemic blending module comprises only 5 units with 2 activities for each unit for 3 minutes of time duration. Karpagavalli, Viji Gripsy, and Nandhini (2021) developed a speech-assistive Tamil learning mobile application for children with a learning disability. Since the application mainly focused the speech development and speech recognition, it missed to prove the effect in dyslexic children.



on phoneme awareness and Sinhala Akshara (letter) found significantly smaller correlations between phoneme awareness and Akshara knowledge. Phoneme awareness did not predict future word reading or Akshara knowledge but phonological memory and syllable awareness on reading were mostly mediated by Akshara knowledge. Akshara's knowledge is the most important predictor of learning to read words.

The study of Krishnan, and Ragavan (2021) developed the word analogy data set to develop the morphology for Tamil word learning using a rules-based morphological segment and meta-embedding techniques. However, it was web-based data set, and require a trained person to access the word list. Moreover, the Tamil talk is a speech-to-text application, (Mann, Weston, Frederic, Ogunshile & Ramachandran, 2019), ThamizhiMorph: A morphological parser for the Tamil language (Sarveswaran,



Dias & Butt, 2021) studies conducted for Tamil language learning. However, these studies do not target reading development.

These applications and interventions are designed to develop specific skills in children with special needs. However, in the Sri Lankan context, such interventions have primarily focused on Sinhala medium children. These efforts have not addressed the identification of poor readers or assisted them with research-based instruments. Additionally, there is no instrument specifically developed for identifying or providing teaching interventions for Tamil children with reading difficulties. These gaps highlight a significant need for targeted approaches to improve the reading fluency of Tamil children with reading difficulties.

Also, the findings of the need analysis illustrated the need for module-based teaching intervention for children with reading difficulties in Sri Lanka. The researcher believes developing and implementing research-based Smart Reading Modules (SRM) could guide the Tamil teachers to teach reading and significantly improve the children with reading difficulties in Sri Lanka.

1.4 Purpose of the Study

This study aims to measure the effects of the Smart Reading Module (SRM) on the reading fluency of children with reading difficulties.

1.4.1 Objectives of the Study

1. To identify the module needs in reading fluency for junior secondary children with reading difficulties in Sri Lanka,
2. To measure the improvement in reading fluency among junior secondary children with reading difficulties after using SRM,
3. To assess the variation in decoding and linguistic comprehension skills between the pre-test and post-tests of the experimental group, and
4. To measure the effect of SRM based teaching intervention in improving the reading fluency of junior secondary children with reading difficulties.

1.5 Research Questions

1. Is there a needs to develop a reading module for the reading fluency of junior secondary children with reading difficulties in Sri Lanka?
2. What is the difference in reading fluency of junior secondary children with reading difficulties during the intervention compared with the comparison group?

3. How do decoding and linguistic comprehension skills vary between the pre-test and post-tests of the experimental group?
4. What is the effect of SRM based teaching intervention in improving the reading fluency of junior secondary children with reading difficulties?

1.6 Research Hypothesis

One null hypothesis is tested in the intervention as follows:

H_0 1: There is no significant difference between students' reading fluency who

receive SRM intervention and students who do not receive SRM intervention.

1.7 Theoretical Framework

To develop the SRM to assist the children with reading difficulties, the researcher used two different types of learning theories which were the most prominent theories to explain learning. The bottom-up model is rooted in behaviorism and the top-down model is from a cognitive perspective.

The bottom-up theory was introduced by Gibson in 1950 in the perception of the visual world (Covarrubias, Jiménez, Cabrera & Costall, 2017; Costall, 2017), is from the behavioral perspective focus on stimuli and response. The stimulus plays a



key role in learning to read. The bottom-up theory views reading development as a simple to complex process as said by Land, and Heard (2018) bottom-up theory is upwards from depth cues. As bottom-up model provides the building block approach to describe the learning to the reading process, focusing on basic to mastery levels, and this theory is used to design the SRM to develop reading fluency in grade six children (junior secondary) with reading difficulties in Sri Lanka.

The structured literacy model has been taken into account to design the SRM for the intervention under the bottom-up processing theory. The structured literacy model proposes the reading intervention at the basic to mastery level. The structured literacy model consists of six skills to develop a reading intervention module namely phonology, sound-symbol association, syllable instruction, morphology, syntax, and semantics (The International Dyslexia Association (IDA), 2017b). Throughout this process, children can decode and comprehend the text that they read.

The top-down theory is from a cognitive perspective which was introduced by Richard Langton Gregory. According to Richard perception requires not only information from the retina but also knowledge-based processes: previous experience, assumptions, and active processing. This theory demonstrates the innate skills to learning and previous experience and personal qualities. This implies that the meaning individuals give to the text depends on their background knowledge and it interacts between thought and language. The top-down theory is downwards from seen depth (Land & Heard, 2018).



Children can develop the sensing ability throughout the meaningful engagement with the text and they can develop self-dialog with the text. The schema theory is adopted for self- dialog and development comprehension (Fang, 2021). The schema theory is from the top-down theory which states learners build upon prior knowledge to organize and construct new knowledge (Neumann & Kopcha, 2018). Readers' world knowledge, previous experience, and ability to infer play very important roles in their reading comprehension (Zhang, 2017).

The reader's previous or background knowledge is used to comprehend the text. Improving comprehension skills develop reading fluency (Yu & Zhu, 2019; Calet, Pérez-Morenilla & de Los Santos-Roig, 2019; Farkas & Jang, 2019; López- O'Connor, 2017). Therefore the researcher believes the schema structures of slots help develop the reading fluency of grade six children with reading difficulties.

These two theories lead to describing perception. The basic skills were expected to develop with the perspective of bottom-up theory then the reading comprehension development will be carried out with the schema theory in a top-down approach activating and using background knowledge. In most situations, bottom-up and top-down processes work together to ensure rapid and accurate performance (Aronoff & Rees-Miller, 2017).

Successful text comprehension relies on the interaction between the bottom-up and top-down processes (Westerveld, Armstrong & Barton, 2020). Therefore, the researcher designed the theoretical concept in the interactive model approach integrating both bottom-up and top-down theories. The Simple View of Reading (SVR)



(Hoover & Gough, 1990) theory integrates these bottom-up and top-down theories providing definitions as reading is a product of decoding and language comprehension. The Simple View of Reading (SVR), according to which Reading Comprehension can be explained by two important components, decoding (D) and linguistic comprehension (LC) and is expressed as $RC = D \times LC$ (Joshi, 2018).

ADDIE is short for Analyse, Design, Develop, Implement and Evaluate. The ADDIE modular model is used to design the Smart Reading Module. Various teaching models were developed by the researchers to meet the needs of the learners, among them, ADDIE is the famous model to develop the teaching modules (Stapa & Mohammad, 2019; Trust & Pektas, 2018). The module development process is started by analyzing the neediness for SRM. Once, the need analysis has been completed the module is designed with the direct and indirect instructional model using multisensory teaching. The researcher developed the components of the SRM to be included in the reading intervention by adapting bottom-up and top-down theories. After 10 weeks of treatment, the attainment level is evaluated. Figure 1.1 illustrates the ADDIE-based modular development process.



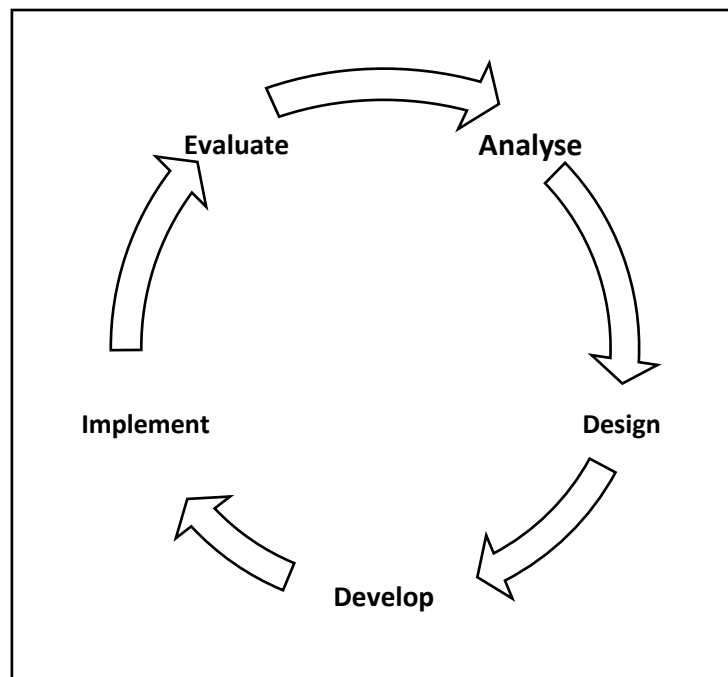


Figure 1.2 shows the theoretical framework of the SRM.

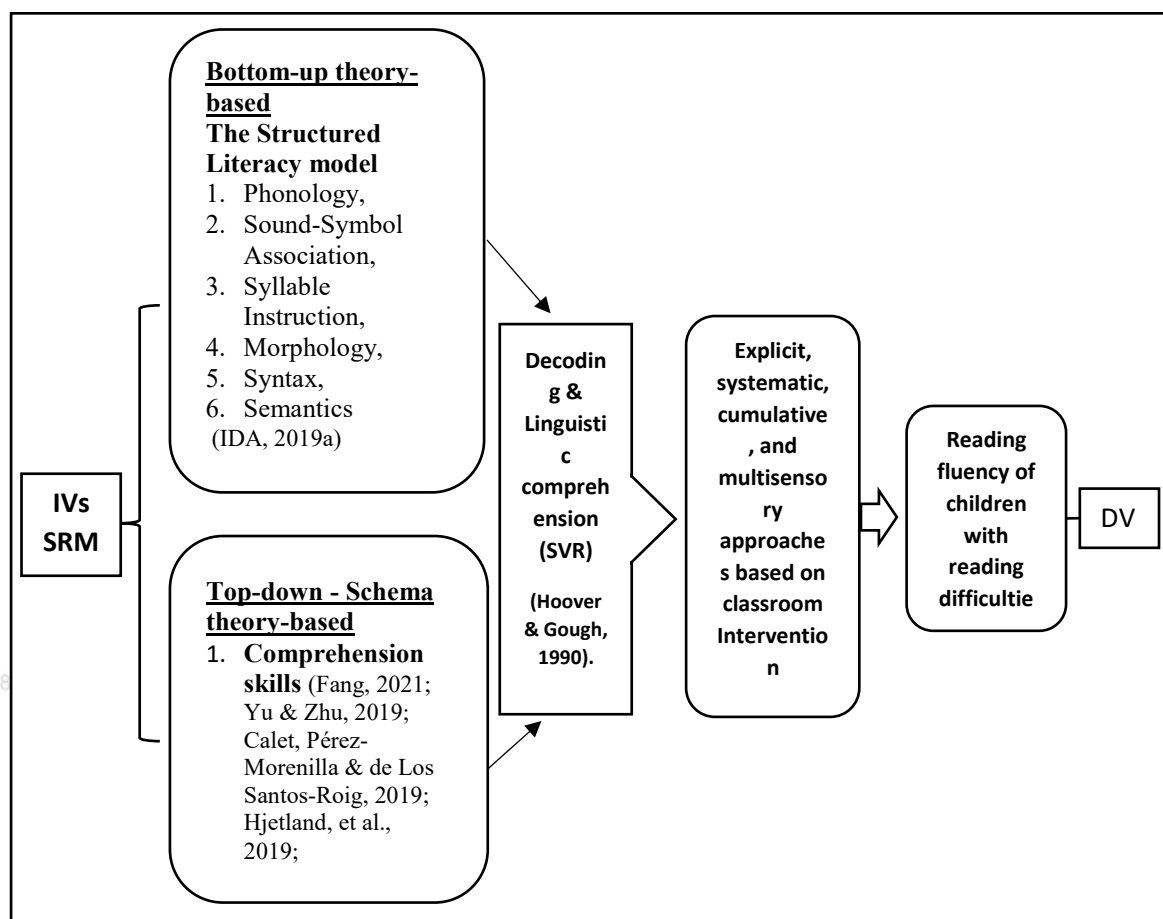


Figure 1.2. The theoretical framework of the SRM

1.8 Conceptual Framework

The SRM is developed based on the bottom-up and top-down theories. The conceptual framework highlights seven components to support the development of the reading ability of children with reading difficulties in grade six. This conceptual framework for SRM includes phonology development, sound-symbol association, syllable instruction,



morphology awareness, syntax development, semantics development (IDA, 2019b), and linguistic comprehension skills development (McDonald, Morrison, Wilcox & Billen, 2021; Gutierrez De Blume, Katz & Bass, 2020). The researcher developed his model from these theories because middle school youth experiencing reading difficulties need intensive, explicit, and systematic reading instruction beyond the core, tier 1 universal instruction (Benner, Michael, Ralston & Lee, 2022).

The simple view of reading (SVR) proposes that performance in reading comprehension is the result of decoding and linguistic comprehension (Hoover & Gough, 1990). Decoding is specified as the ability to derive efficiently a mental representation from printed text. Linguistic comprehension is the ability to understand oral language (Lonigan, Burgess & Schatschneider, 2018; Joshi, 2018). Hence, the researcher conceptualized reading fluency as a development of both decoding and comprehension. The SRM focuses the reading development as a process of making meaning from text. The reading fluency development is carried out step by step development of components. Improvement in one subcomponent may directly or indirectly affect the improvement of another subcomponent (Nation, 2019). The development of each component is the path to the next level. The reading begins in seeing the printed materials and ends in comprehending the text's meaning.

Phonology awareness is the primary step in intervention to develop reading. Phonology awareness is the study of the sound structure of spoken words including rhyming, counting words in spoken sentences, and clapping syllables in spoken words. Also, phonological awareness focuses on phonemic awareness which is the ability to segment words into their component sounds (IDA, 2019b). The Tamil alphabet contains





247 phonetics (vowel sounds -12, consonant sounds - 18, consonant-vowel sounds - 216, and aayutham – 1).

Phonological awareness is the ability to manipulate sounds in spoken words. These sounds include phonemes, onsets and rimes, and syllables (Sargiani, Ehri & Maluf, 2021). Phonological awareness plays a vital role in learning to read because it helps children connect spoken language to written language (Birsh & Carreker, 2018). The development of phonological awareness is the starting point in oral language which helps the children to develop attention and listening skills. Phonological awareness is important because it strongly supports our learning of how the words in our language are represented in print. Children who have problems with phoneme identification thus do not read well and also have difficulties in comprehending texts (Kanapathy, 2019).

Training in listening, recalling, and sequencing are expected to develop phonological awareness. Children can develop both auditory and visual discrimination to link sounds and letters throughout phonological awareness. Phonological awareness is a critical component of early reading. Second, many skills are correlated with phonological awareness (Erskine, Munson & Edwards, 2020).

Sound-symbol association is the second level of intervention to help the children to map out the phonemes to symbols or printed letters. Grapheme–phoneme knowledge and phonemic segmentation are key foundational skills that launch development followed subsequently by knowledge of syllabic and morphemic spelling-sound units (Ehri, 2020). Sound-symbol association is taught in reading and spelling. Teaching reading and spelling in co-articulation may be promising in helping students with intellectual disabilities develop spelling skills (Sermier Dessemontet, de





Chambrier, Martinet, Meuli & Linder, 2021). Children were taught to blend the sounds and letters into words as well as segment whole words into individual sounds.

Syllable instruction takes place at the next level, expected to develop fluency. A syllable is a unit of oral or written language with one vowel sound (IDA, 2020). Syllable instruction includes the teaching of the organization of the sound patterns of words and word strings to organize an idea and gain accuracy in reading the word. Children can determine the sound of the vowel and consonants in the syllable with guided oral reading practices.

The instruction for morphology development is carried out next to the Syllable Instruction. Morphological relationships entail systematic mappings between word form (phonology and orthography) and word meaning (semantics and grammar) (Dawson, Rastle & Ricketts, 2021). Morphological awareness and prosodic fluency are emphasized to foster deeper, more meaningful transactions between students and texts (Bart-Addison & Griffin, 2021). Children were taught to identify the base words, roots, prefixes, and suffixes.

Once decoding skill is developed, the linguistic development is carried out with syntactic, semantic and comprehension skills. Syntax instruction is the fifth level in reading intervention to acquire meaning from text. Syntax is the set of principles that dictate the sequence and function of words in a sentence to convey meaning. It helps to learn to combine short, choppy sentences into longer, grammatically correct sentences (Spear-Swerling, 2018). Grammar patterns, sentence variation from simple to complex, and the mechanics of language were taught to the children for meaningful reading.



Semantics instruction takes place in sixth in reading intervention directly connected to decoding and linguistic comprehension skills development. Meanings of topical nouns or verbs can be explored and elaborated through semantic feature mapping. Semantic features are specific, component meanings associated with words (Haynes, Smith & Laud, 2019). The instruction includes reading practices and vocabulary development.

The reading comprehension practices were carried out in last to develop the reading fluency of children with reading difficulties. Because the reader cannot understand the text if they cannot decode a reasonable number of the words and effective reading comprehension also requires good language understanding more generally (Oakhill, Cain & Elbro, 2019). Reading comprehension is one of the most complex cognitive activities in which humans engage, making it difficult to teach, measure, and research (Elleman & Oslund, 2019).

Word reading (decoding) and language skills are the foundations for reading comprehension (Hjetland, Lervåg, Lyster, Hagtvet, Hulme & Melby-Lervåg, 2019). Reading comprehension is the skills and processes that are needed to understand a text. During the intervention, the readers' background knowledge is connected with the text to acquire the meaning from the text. The background knowledge of reading strategies and children's experiences help them to understand the text and its meaning. Figure 1.3 illustrates the conceptual framework of the SRM.

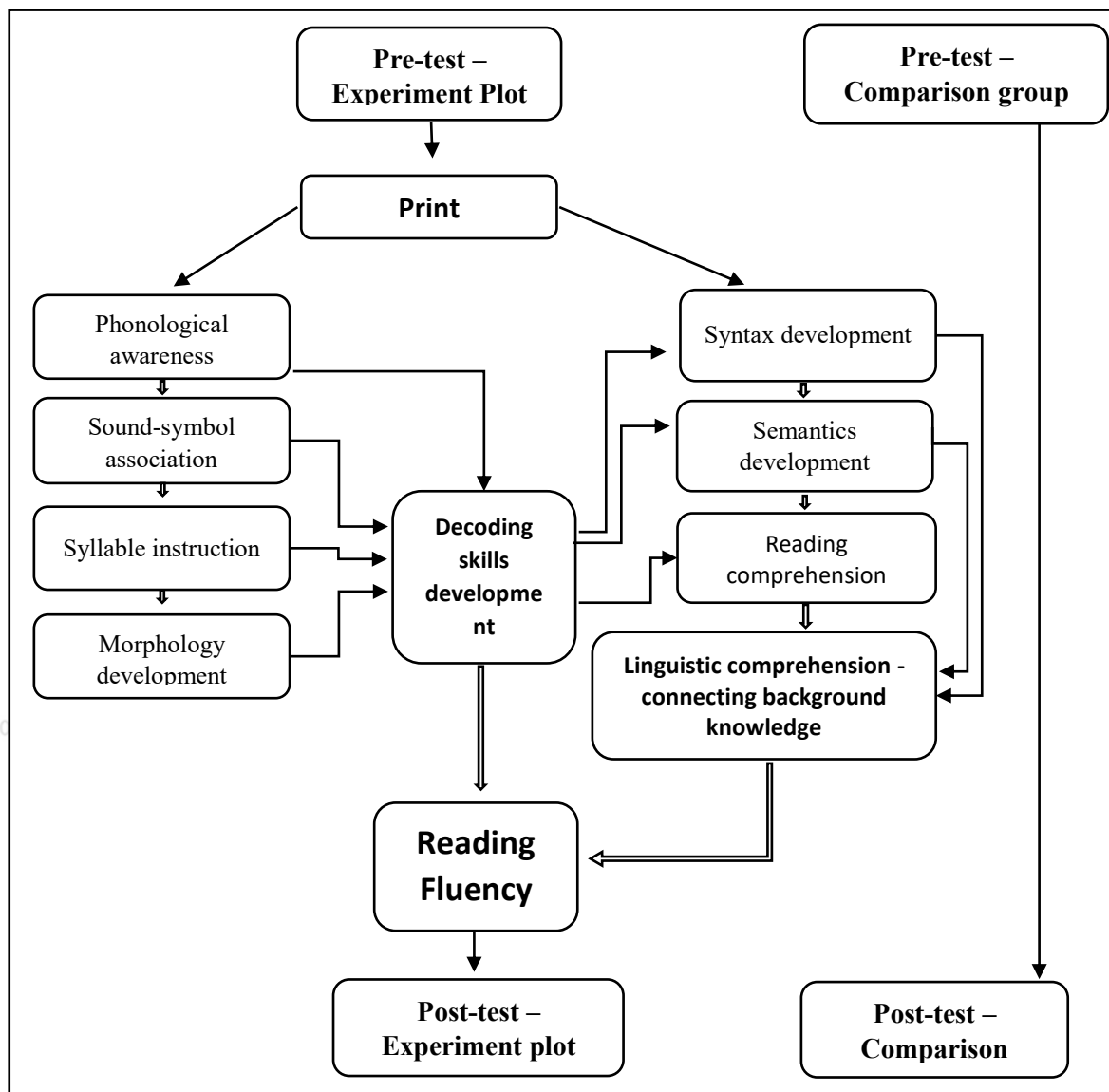


Figure 1.3. SRM intervention conceptual framework

1.9 Significance of the Study

This study is to improve the reading ability of children with reading difficulties in grade six through the SRM and teaching and learning techniques. This study will influence

significantly the following areas, (i) Special education, (ii) Research and practices, (iii) Classroom teaching and learning in Sri Lanka, (iv) Language development, and (v) Government and policymakers.

1.9.1 Special Education

This study will be a milestone in special educational settings because of different perspectives. This study differentiates the reading difficulties (poor reading) and diagnosed dyslexia. The reading difficulties were considered earlier as learning disabilities, further, it was separated as dyslexia. Poor readers are also considered dyslexic because of misconceptions (Miller, 2018).

However, this study provides a clear cut of differences between diagnosed dyslexia and poor reading. Because the children who struggle in reading appear with normal IQ and mental abilities compared with their peers.

1.9.2 Research and Practices

This study design and teaching methods may be influenced in future research and practices. Especially, this module-based intervention is designed to adapt direct and indirect instruction models and multisensory teaching techniques. Phonology, sound-symbol association, syllable instruction, morphology, syntax, and semantics lessons

were carried out with multisensory teaching and learning methods, and reading comprehension skills were taught by direct instructions.

This study is the multi-component skills development model in children with reading difficulties. Previous teaching interventions conducted on children with reading difficulties focused only on some components of reading skills such as phonological awareness, fluency development, oral reading, and comprehension. However, this study focuses on seven components of phonology, sound-symbol association, syllable instruction, morphology, syntax, semantics, and comprehension skills to develop reading ability.

1.9.3 Classroom Teaching and Learning of Secondary Schools in Sri Lanka

In the Sri Lankan context, there is no research-based practice and timely intervention given to them through the curriculum with tools for children with reading difficulties. This SRM intervention will significantly contribute to classroom-based intervention in Sri Lanka.

The Sri Lanka curriculum proposes the teaching to read the children throughout the classroom teaching and learning process. However, it does not guide teachers to identify and teach children. So, this study may guide for them to teach reading in the classroom.

Several studies found that teachers do not have awareness of children with special needs. The poor readers were neglected or ignored due to unawareness or workloads. In such a situation, they consider the poor readers as dyslexic and they cannot be treated in normal classrooms. This study may help the teachers to get awareness about children with special needs and children with reading difficulties.

Children with reading difficulties must be identified earlier and treated on time. In the Sri Lankan context, No identification nor timely intervention was provided to children with reading difficulties. This study may help them to earlier identification and intervention. The pre-test of the SRM module may help the teachers to carry out classroom-based identification and interventions and cater to the needs of children with reading difficulties. Teachers can use module lessons to teach various skills such as

1.9.4 Tamil Reading Development

No such studies are focusing on Tamil medium children with reading difficulties in Sri Lanka. So, the researcher believes that this study may be a starting point for future studies. Future studies in special education, dyslexia, and reading difficulties may utilize this intervention model in research and practice.

This intervention primarily focuses to develop the reading ability of junior secondary Tamil medium students with reading difficulties. However, these instruments can be translated into any language adopting language grammar patterns.

Like most of the instruments developed in English and translated into Tamil, this may help the international audience in further research and practices.

1.9.5 Government and Policymakers

The researcher hopes the findings of the study may help the government and policymakers to revise the curriculum setting in primary and secondary education in Sri Lanka. They may focus more on special education, literacy development, and remedy programs. Especially, in the development of reading ability to ensure the lifelong skills to be achieved in the primary and secondary students.

1.10 Limitations of the Study

Since this study focuses only development of reading fluency, this study has some limitations. This study aims to assess the effects of the SRM on the reading fluency of grade six (junior secondary) children with reading difficulties in schools of Puttalam Zonal Education. Dyslexia is the broad term used to cover reading-related deficiency which is affected by neuron-developmental disorders or other biological factors, did not include in this study. This study covers reading difficulties or poor reading in the usual classroom. The terminology of children with reading difficulties is used here to specify the children who struggle in reading or are poor readers. Children with reading difficulties appear normal in physical, IQ, and cognitive levels, but they need more time to develop reading.

This study only covers the reading performance of grade six children with reading difficulties. However, other educational achievements of students did not measure in this study. Though the effect of the SRM is assessed, further studies may be conducted to ensure the findings. Furthermore, this study period was limited to 2022-2023. Since the study data collection was completed within the time frame, a ten-week teaching intervention has carried out for the study. Increasing the intervention period by more than ten weeks may ensure the findings in the future.

The study modules were designed by utilizing the need analysis, findings, and recommendations of empirical studies. The Smart Reading Modules is designed to include seven main skills to develop reading fluency in the study sample of children with reading difficulties. This is because of simple to complex and primary to mastery level reading fluency achievement. However, some components of reading skills may find unnecessary to some students. Also, some recommended skills in studies were not included. Future studies may improve the design of the study.

The study population was schools of Puttalam Education Zone, Puttalam South Divisions was selected using a simple random sampling method. The Puttalam South Division consists of 43 schools. The study sample was selected by using grade five scholarship marks, year-end exam marks and a class room reading test. Upon the test mark, 60 students were selected for the study. 30 students for intervention and 30 for the comparison group. Further studies should be carried out to cover more generalized results.



Typically, children with reading difficulties experience multiple psychological problems such as low self-esteem, stress, anxiety, depression, and phobias. However, this study only focuses on the reading problems of children with reading difficulties. Other problems were not taken into consideration.

This study was carried out with modules based intervention on the ADDIE modular model with integrated theoretical bases of bottom-up, top-down, and SVR theories. The SRM is validated by expert panels and also checked for reliability. Further studies may be conducted to ensure global validation. Data collections were carried out only by junior secondary teachers, class literacy teachers, and children with reading difficulties. Questionnaires, and pre-test and post-test were taken place in the study for data collection.



understanding of the SRM and the strategies for the reading practice of children with reading difficulties in junior secondary. Since the components of the modules and strategies will be new to the children, the researcher thinks that it will be unrealistic for him to expect them to use the strategies without the assistance of the teachers.

1.11 Operational Definitions

1.11.1 The Effect

In this study, the term effect is defined as the meaningful relationship between the independent variable (the Smart Reading Module (SRM)-based teaching intervention)





and the dependent variables (reading fluency, decoding skills, and linguistic comprehension of junior secondary children with reading difficulties). The term captures the impact of the teaching intervention by comparing the experimental and comparison groups and measuring the changes in their pre-test and post-test scores. The study examines how the SRM intervention influences the improvement in the reading abilities of the experimental group, demonstrating a significant difference in outcomes between the groups and across testing periods.

1.11.2 Smart Reading Module (SRM)

The Smart Reading Module is developed by the researcher. The SRM term is coined by the researcher, to use a name for module-based reading intervention. The Smart Reading Module is a set of independent units of intervention. The Smart Reading Module (SRM) is the reading intervention module designed to use in the classroom teaching intervention purposes to develop the reading fluency of children with reading difficulties. SRM includes a teacher's guide and a student's exercise book with seven units for components of phonology, sound-symbol association, syllable instruction, morphology, syntax, semantics, and comprehension skills. The SRM teacher's guide provides explicit instruction to the teachers to teach reading and the student's exercise book provides the guided and self-directed practices to learn the reading.



1.11.3 Reading Fluency

Reading fluency is the ability to decode and comprehend text spontaneously. Key indicators of reading fluency include word recognition accuracy, reading speed, and expressive reading (Hak & Wang, 2017). In this study, reading fluency refers to the development of decoding (word reading) and comprehension (meaning-making) skills. The intervention aims to enhance children's understanding of spoken language and written text. Through this teaching intervention, children are facilitated in comprehending both spoken language and printed words.

1.11.4 Children with Reading Difficulties

The terminology of children with reading difficulties is used here to specify the children who struggle in reading or are poor readers. Individuals with unexpected reading problems who are poor readers, appear with normal physical, and cognitive development compared with their peers (Kelso et al., 2020). The researcher uses the term reading difficulties for intervention purposes. The term reading difficulties is used to indicate the common poor readers who were not clinically diagnosed but struggling to read identified by the class teachers and language teachers while teaching and assessments. In this study, children with reading difficulties indicate poor readers including mild and moderate levels of dyslexia.

1.11.5 Junior Secondary

The school educational settings of Sri Lanka is divided into three major part. The primary, secondary, and advanced levels. The primary starts at age five from grade one to grade five. The secondary is divided into junior secondary (grade 6 to 9) and senior secondary (grade 10 -11). The advanced level (grade 12 -13) is the final level of school education. The term junior secondary is used here to indicate grade six children.

1.12 Summary

This chapter is about the introduction to the study. This chapter presented the introduction and the background of the study to introduce the Sri Lankan educational benchmarks. In the background, the educational policy and practices and reading difficulties were discussed in the Sri Lankan context. Moreover, this chapter addressed the research problem with empirical evidence, the purpose of the study, research questions, and the hypothesis tested in the study. In the theoretical framework, the main theories of bottom-up, top-down, and SVR were analyzed. Furthermore, conceptual frameworks and their key areas, the significance of the study, limitations, operational terms used in this study, and a summary were discussed in this chapter.