DEVELOPMENT OF CLUSTER-BASED CONNECTED PASSAGES IN KANNADA

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CERTIFICATE

This is to certify that this dissertation entitled **"Development of cluster-based connected passages in Kannada"** is a bonafide work submitted as part of fulfilment of the degree of Master of Science (Speech Language Pathology) of the student with Registration Number P01II24S123042. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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This is to certify that this dissertation entitled **" Development of Cluster-Based Connected Passages in Kannada"** has been prepared under my supervision and guidance. It is also being certified that this dissertation has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled **"Development of Cluster-Based Connected Passages in Kannada"** is the result of my own study under the guidance of Dr. Sangeetha Mahesh, Associate professor and Head, Tele-Centre for Person with Communication Disorder (TCPD), All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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ABSTRACT

The present study aimed to develop and validate consonant cluster passages in Kannada for primary-level children, secondary-level children, and adults. Consonant clusters represent phonologically complex structures requiring increased articulatory coordination and phonological planning during speech production. Despite the clinical significance of consonant clusters in speech assessment and intervention, standardized Kannada reading materials systematically incorporating consonant clusters are currently limited. The study employed a cross-sectional descriptive design across three phases: (a) corpus compilation and familiarity validation of consonant cluster words, (b) content validation through expert review, and (c) validation of applicability and preliminary clinical usefulness. A total of 51 participants were included across three participant levels: primary-level children (8–12 years), secondary-level children (13–17 years), and adults (18 years and above), comprising typically developing individuals, individuals with stuttering, and individuals with speech sound disorders. Consonant cluster words achieving a minimum expert agreement of 75% were retained for passage development. Three consonant cluster passages in Kannada were developed and demonstrated high content validity, with a Content Validity Index of 1.0 across all parameters. Typically developing participants demonstrated excellent reading accuracy and consonant cluster accuracy across all passages. Individuals with stuttering demonstrated increased dysfluencies during consonant cluster production, while individuals with speech sound disorders demonstrated increased consonant cluster errors, with cluster reduction and substitution as the most frequent error patterns. The findings indicate that the developed passages are clinically useful for evaluating consonant cluster production, fluency disruptions, and speech error patterns in Kannada-speaking individuals with speech disorders.

Keywords: Consonant Clusters, Kannada connected passages, Stuttering, Speech sound disorders.

CHAPTER I

INTRODUCTION

Speech and language are essential elements of human communication and are important for social engagement, academic success, and general communicative ability. Phonological development is a critical component of speech development and is essential for accurate speech production. The ability to form consonant clusters is an essential part of phonological development. Compared to single consonants, these clusters need more effort to produce speech since they contain two or more consonants inside a syllable. They are therefore usually learned later in speech development (Bernthal et al., 2017; Stoel-Gammon, 1987).

Accurate synchronization of articulatory actions, phonological planning, and motor execution is necessary for consonant cluster production. Consonant clusters place additional strain on the speech production system because they are more complex phonologically and articulatorily than simple syllable patterns (Bernthal et al., 2017). According to Shriberg and Kwiatkowski (1980), consonant cluster acquisition is a prolonged developmental process, with simpler clusters generally emerging earlier and more complex clusters developing later. Consequently, difficulties in producing consonant clusters may adversely affect speech accuracy and fluency, particularly in connected speech (Bernthal et al., 2017).

Speech production requires the coordinated interaction of linguistic planning, phonological encoding, and motor execution. Interruptions might result in speech dysfluencies consisting of repetitions, prolongations, and blocks, but when these mechanisms coordinate effectively, fluent speech is produced. Howell and Au-Yeung (2002) suggested that increased phonological complexity may contribute to fluency breakdowns when speech planning and execution become unsynchronized. In a recent investigation, Sangeetha and Reny (2020) examined how syllable complexity affected speech dysfluencies in Kannada-speaking adults with stuttering. They concluded that words with consonant clusters elicited more dysfluencies

than words without consonant clusters. The authors suggested that the increased phonological complexity associated with consonant clusters may place additional demands on speech motor planning and execution during connected speech. As the study focused on Kannada-speaking adults, it provides language-specific evidence for the influence of consonant-cluster complexity on fluency breakdown.

Initially, isolated words and syllable-level tasks have been used to evaluate speech sound production. These tasks, however, may not represent speech performance in regular communication situations. Connected speech provides a more natural and ecologically valid method of assessment, as it includes coarticulatory effects, prosodic variations, and contextual influences on speech production (Kent, 1997). Therefore, connected speech samples and reading passages are widely used in speech-language pathology to assess articulation, fluency, and overall speech intelligibility (Fairbanks, 1960; Wiederholt & Bryant, 1992).

In the Indian context, particularly in Kannada, the availability of standardised connected speech materials for assessing consonant-cluster production is limited. To the best of our knowledge, no standardized Kannada connected-speech materials specifically designed to assess consonant cluster production across different educational and adult levels are currently available. According to Sangeetha (2018), who developed and standardized reading passages for children in grades III–VII in Kannada, proficiency in reading increased with age, indicating developmental sensitivity. However, these passages did not specifically target consonant cluster production across varying word positions and levels of phonological complexity. The absence of structured Kannada materials systematically distributed across consonant clusters limits clinicians' ability to evaluate consonant-cluster production in connected speech contexts. Therefore, there is a need to develop consonant cluster passages in Kannada that systematically incorporate consonant clusters across initial, medial, and final word positions with graded levels of phonological complexity. Such materials would facilitate

a comprehensive assessment of consonant cluster production in naturalistic speech contexts and assist speech-language pathologists in accurate assessment, diagnosis, and intervention planning.

Hence, the present study aims to develop consonant cluster passages in Kannada that systematically include consonant clusters at varying levels of phonological complexity for use in speech assessment.

1.1 Need for the Study

Consonant clusters place increased demands on speech planning and motor execution and are therefore commonly associated with stuttering episodes (Howell & Au-Yeung, 2002; Bernstein Ratner, 2005; Smith & Weber, 2017). Studies on cluster development also demonstrate that Kannada cluster acquisition is prolonged, with mastery of complex or three-element clusters continuing into later childhood and medial clusters appearing earlier than initial ones (Divyashree, 2018).

Connected passages are a valuable resource for assessing fluency in natural, continuous speech, yet the Kannada passages developed to date have focused mainly on singleton consonants (Rathna & Bettagiri, 1972; Ramaa, 1985; Savithri & Jayaram, 2004, 2005; Sangeetha, 2018). Although consonant clusters are known to be developmentally complex and clinically important in speech disorders, existing materials have not been designed to target them specifically. As a result, clinicians may have limited opportunities to systematically assess dysfluencies associated with consonant cluster production in connected speech.

The need for this study also arises from the lack of Kannada reading materials that specifically target words with consonant clusters, which are known to be particularly prone to dysfluency and articulation errors (Sangeetha & Geetha, 2015). Developing consonant cluster passages will provide a practical resource for assessing and monitoring speech disorders in clinical populations.

Developing a cluster-based passage is especially crucial in this linguistic context, since Kannada allows a variety of cluster types that are distinct from those in other languages. Without these resources, speech language pathologist might not be able to accurately record particular cluster fluency patterns, making them crucial for thorough assessment and successful treatment planning. In order to provide researchers and clinicians with a standardized, linguistically suitable tool that methodically elicits clusters in natural speech, it is crucial to develop and validate a cluster-based connected passage in Kannada. A resource like this would improve clinical evaluation and promote cross-linguistic comprehension of the connection between phonological complexity and speech production challenges in people with speech disorders. In addition to facilitating clinical assessment, such passages may also contribute to the development of language-specific tools for research on phonological complexity and connected speech production in Kannada.

1.2 Aim of the Study

The study aims to develop consonant cluster passages in Kannada.

1.3 Objectives of the Study

1. To identify consonant cluster words in Kannada and validate their familiarity among Kannada-speaking school-aged children and adults through expert evaluation.
2. To develop three sets of connected Kannada passages incorporating consonant cluster words with varying levels of linguistic complexity for primary-level children, secondary-level school children, and adults.
3. To establish the content validity of the developed passages through expert review with respect to ambiguity, cultural appropriateness, representativeness, and clarity.
4. To evaluate the applicability and usability of the developed passages by administering them to participants across the primary, secondary level children and the adult population.
5. To conduct preliminary clinical validation of the developed passages by administering them to individuals with speech disorders.

CHAPTER II

REVIEW OF LITERATURE

A consonant cluster occurs when several consonants appear consecutively without a vowel in between (Grunwell, 1987; McLeod et al., 2001). Consonant clusters are regarded as extremely complicated phonological structures because of the greater articulatory and planning requirements involved in their formation.

A number of criteria have been used to categorize clusters. Word-initial, word-medial, and word-final clusters are among the typical classifications according to their placement inside the word (Grunwell, 1985). They can also be divided into clusters of two, three, and four elements based on how many elements they include. Other categories include articulatory traits like homorganic clusters, where consonants share common articulation position, and heterorganic clusters, where consonants diverge (Browman & Goldstein, 1990). Clusters can also be classified as heterosyllabic or tautosyllabic depending on their syllable structure (Chervela, 1981).

Classification systems are crucial for understanding the structurally complex nature of clusters as well as for developing language standardized materials. These classifications are important for understanding the structural organization and phonological complexity of consonant clusters across languages. These categories are especially pertinent to the current investigation.

2.1 Complexity of Clusters in Stuttering

Consonant clusters require synchronization of multiple articulatory movements without intervening vowels, thereby increasing articulatory complexity. Consonant clusters are considered phonologically complex entities. As a result, speaker is subjected to increased cognitive and articulatory demands. The number of parts, the phonetic characteristics of the

constituent consonants, and their position within the word all contribute to the complexity of clusters.

There is strong evidence that disturbances in fluency are related to phonological complexity. Stuttering is more common on consonants than on vowels, according to early findings made by Brown (1945). According to later research, dysfluencies are more common on consonant clusters than on single consonants, indicating that phonological complexity plays a role in fluency disruptions (Howell & Au-Yeung, 2007; Howell et al., 2000; LaSalle & Wolk, 2011). Further support comes from Kannada-speaking adults who stutter, who demonstrated higher percentages of dysfluencies on words containing consonant clusters than on words without consonant clusters, highlighting the influence of syllable complexity on stuttering (Mahesh & Raju, 2021a, 2021b). Because they require more motor coordination, are learned later in development, and require more forethought from the speaker, consonant clusters, especially in the word-initial position, are more likely to generate dysfluency than singleton consonants. (Howell et al., 2000). Increased dysfluency is attributed to articulatory and motor complexity, which requires the coordination of multiple segments without intervening vowels (Robb & Blomgren, 1996).

Howell et al., (2009) investigated the Index of Phonetic Complexity (IPC) across conversational tasks in English-speaking children aged 6 to 18. Despite ranking relatively low in the overall complexity hierarchy, the results showed that consonant clusters enhanced the frequency of stuttering. In a similar vein, Huinck et al. (2004) investigated the production of various consonant cluster types in Dutch and reported that adults who stutter (AWS; mean age = 23.7 years) produced greater errors and dysfluencies, especially when homorganic clusters occurred across syllable boundaries (e.g., consonants distributed between adjacent syllables such as /nt/ in "winter"). Additionally, they showed considerably longer reaction times,

indicating that producing two consonants across a syllable boundary with the same location of articulation puts more strain on speech start and motor planning.

Additionally, in a non-word reading test, Masumi et al. (2015) discovered a significant difference in the frequency of dysfluencies among clustered and non-clustered words in a multilingual case research study, Morrish et al. (2017) examined stuttering instances in Afrikaans, German, and English. In all three languages, the investigators found that certain consonant clusters, particularly [kl], frequently caused stuttering. The pattern implies that the effect is not specific to any one language. They clarify that dysfluencies are more common because clusters [kl], which include a variety of sounds, are more difficult to plan and coordinate during speaking.

In a more recent study, Sangeetha and Reny (2020) studied 30 stuttering adults whose native language is Kannada (ages 18 to 30) they used a standard passage that included both words with consonant clusters (WCC) and words without consonant clusters (WWCC). The results showed that WCC exhibited higher levels of dysfluencies than WWCC in both moderate and severe stuttering groups. They said that phonological and syllable complexity significantly affected fluency, with stutterers exhibiting higher speech dysfluencies as complexity increased. The findings also suggest that consonant cluster patterns enhance phonological and articulatory complexity, increasing the need for motor speech planning and articulatory coordination during connected speech production. As the study include Kannada speakers it offers language-specific evidence for the impact of consonant cluster complexity on fluency breakdown because it focused on Kannada-speaking individuals. These results imply that higher speech dysfluency in stutterers may be related to consonant-cluster complexity.

However, in contrast to the above studies, Throneburg et al. (1994) investigated the effect of phonological difficulty on dysfluencies in children who have stuttering (CWS). They found that consonant clusters did not contribute to the occurrence of dysfluencies. Similarly,

Byrd et al. (2017) studied the influence of phonetic complexity in English on picture naming tasks in 15 AWS and non-stuttering adults (AWNS) aged 18 to 46 years. There was no significant difference in the speed of producing these consonant clusters between AWS and AWNS. Most studies support that the consonant clusters are associated with increased dysfluency compared to the singleton consonants, except for the studies of Byrd et al. (2017) and Throneburg et al. (1994). Mixed results have been published on the phonetic impact of consonant clusters on stuttering. Methodological differences (e.g., tasks) and language features (e.g., phonetic complexity) may explain these findings.

Several explanations have been offered to account for the particular difficulty of consonant clusters in fluency. Clusters raise the phonological planning load, according to the EXPLAN hypothesis (Howell & Au-Yeung, 2002). When preparation cannot keep up with execution, stuttering happens. From a phonological perspective, clusters are considered marked structures since they are less prevalent in languages and are acquired later than fundamental syllables, making them more prone to disruption (Bernstein Ratner, 2005). Furthermore, motor control research indicates that the production of consonant clusters involves rapid articulatory movements between adjacent consonants, placing greater demands on speech motor coordination and increasing the probability of dysfluent speech in individuals with stuttering (Smith & Weber, 2017).

2.2 Theoretical Framework

A range of theoretical models has been developed to explain stuttering, especially in relation to linguistic planning and motor execution processes.

2.2.1 EXPLAN Hypothesis

According to Howell & Au-Yeung's (2002) EXPLAN hypothesis (Execution and Planning), stuttering arises as execution takes place prior to completion of the necessary phonological planning. Under the current model, complex linguistic items such as consonant

clusters are considered to require more planning time, hence causing delay in planning and the speaker to become dysfluent due to execution taking place without adequate planning.

2.2.2 Motor Control Theory

Motor control theories propose that stuttering occurs due to disorders of the temporal coordination, organization and production of speech movements. Speech production is complex, requiring coordinated timing of several articulators (lips, tongue, jaw and velum) working together smoothly and accurately in the extremely short time available. If the motor coordination breaks down it can result in the speech disfluencies of stuttering, namely the repetition, prolongations and blocks.

Clusters are difficult to produce because two or more consonants are produced rapidly and continuously, with very short intervals between articulator movements. For this reason, they pose a further demand upon the speech motor system. They are more articulatory precise, temporally coordinated, and motor planned than basic syllable structures. Speech motor instability may result from increased phonological and articulatory complexity, according to Smith and Weber (2017). Consonant clusters can then become problematic for an individual to produce, especially during connected speech production that demands sustained articulatory coordination.

2.2.3 Linguistic Encoding in Speech Production

Linguistic encoding theories propose stuttering is caused by difficulties in language processing, especially phonological encoding. Levelt (1989) proposes that phonological encoding consists of, 'the recovery of phonological segments, their assembly into syllable structures, and the addition of stress contours in preparation for speech production'. Some phonological constructions, like consonant clusters, may be particularly challenging as more encoding is needed and the cognitive load involved may lead to a delay in the planning of speech. The increased production effort associated with consonant clusters may result in more

errors and disfluencies in the production of them. The above discussions reflect the relevance of phonological complexity in speech production and suggest why consonant clusters should be considered an important variable in this experiment. When taken as a whole, these theoretical stances imply that consonant clusters may put more strain on phonological planning and speech motor execution, which could lead to speech production issues in both fluent and dysfluent speakers.

2.3 Acquisition of a Consonant Cluster

Acquiring consonant clusters is a long and gradual process taking years to unfold during the course of the child's phonological development. Children rarely learn to produce cluster correctly without an intervening stage of non-adult productions.

Table 2.1

1. *Age of Acquisition in Phonological Development*

Criterion	Level of Acquisition	Description
50% criterion	Emergence Customary Production	A speech sound is considered acquired when at least 50% of children produce it correctly in at least two-word positions.
75% criterion	Customary Production	A speech sound is considered established when at least 75% of children produce it correctly across all word positions.
90% criterion	Mastery	A speech sound is considered mastered when at least 90% of children produce it correctly in all word positions.

Children gradually pick up speech sounds as they mature, moving from simple to complicated phases of phonological development. Dyson (1998) outlined three acquisition levels as indicated in Table 2.1

The developmental data indicate that consonant cluster acquisition begins as early as two years of age; however, mastery may extend until 9–12 years, reflecting their prolonged developmental complexity. In a study of two-year-olds' phonological abilities, Carol Stoel-

Gammon (1987) reported that 58% of children produced at least two distinct initial clusters, whereas only 30% produced two or more words containing medial clusters, compared to 48% who produced final clusters. These findings suggest that cluster production emerges earlier in initial and final positions than in medial positions. Similarly, Dyson (1998) observed that a wide range of consonant clusters appeared in both initial and final positions by 2–3 years of age.

These findings suggest that consonant cluster acquisition is influenced by both cluster position and structural complexity. Subsequent studies across different languages have further demonstrated that medial clusters are often acquired earlier than initial clusters and that simpler two-element clusters are acquired before more complex multi-element clusters.

2.3.1 Non-Adult Realisations and Error Patterns

Children do not directly acquire the target of cluster production; instead, their production goes through a significant number of non-adult productions as they mature. In order to comprehend the normal and atypical patterns in production throughout the development and to learn how the complex cluster acquisition is progressively developing, these non-adult productions must be examined.

During the acquisition of consonant clusters, children exhibit various non-adult realizations, reflecting the difficulty of producing complex phonological structures. The most commonly observed phonological processes include:

- **Cluster reduction:** deletion of one consonant in the cluster
- **Cluster simplification:** substitution or distortion of one or both elements
- **Epenthesis:** insertion of a vowel within the cluster
- **Coalescence:** merging of features from multiple consonants
- **Metathesis:** reordering of sounds within the cluster

Among these, cluster reduction is the most frequent error pattern observed in typically developing children.

2.4 Consonant Clusters in Indian Languages

Consonant cluster acquisition in Indian languages has mostly been studied in the context of phonological development and articulation evaluation. The majority of research has focused on developmental patterns.

2.4.1 Telugu

Studies on Telugu-speaking children have shown that consonant cluster acquisition is gradual and influenced by phonological complexity. Chervela (1981) reported that young children commonly exhibit processes such as cluster reduction, substitution, and assimilation during early stages of development.

Padmaja (1988), in the development of the Telugu Test of Articulation and Discrimination, found that several consonant clusters were acquired by the age of approximately 3.6 years in a majority of children. Furthermore, compared to initial and end clusters, medial clusters are more common and are acquired earlier, according to Neethipriya and Manjula (2007). Additionally, they noted that two-element clusters are more prevalent than three-element clusters. In the same manner, Usha and Sreedevi (2010) discovered that cluster acquisition starts early but progresses gradually, with certain clusters acquired by the age of three.

In order to produce normative and standard data on the acquisition of non-geminate consonant clusters in native Telugu-language-speaking children between the ages of 4 and 6, Sneha and Sreedevi (2012) carried out a developmental study. The study found a consistent developmental tendency and only looked at cluster acquisition trends in this age category. The findings demonstrated that children's ability to produce consonant clusters gradually improves

with age, demonstrating maturation in both articulatory and phonological development. This study provides helpful normative data on the acquisition of Telugu clusters.

2.4.2 Malayalam

According to Maya (1990), learning Malayalam consonant clusters starts at age 4.7 years and lasts till age 7.0 years. Simple clusters are learned before more complex ones. According to Divya and Sreedevi's (2010) study on cluster acquisition among children aged 2.0-3.0 years, the development of clusters begins at 2.9 years, however errors such substitutions are frequently observed at this age. Between the ages of 3 and 6 years, Neenu and Sreedevi (2011), Vipina and Sreedevi (2011), and Vrinda and Sreedevi (2011) examined how children acquired up initial and medial consonant clusters. The results showed that medial clusters are learned before beginning clusters and that learning gets better with age.

According to Neenu and Sreedevi (2011), errors including coalescence and metathesis were noted, and several medial clusters were acquired at the age of 4.0. According to Vipina and Sreedevi (2011), the most frequent error patterns are cluster reductions and simplification, and both initial and medial clusters grow with age. The majority of clusters were acquired by 6.0 years, according to Vrinda and Sreedevi (2011), while medial clusters were often acquired before beginning clusters.

2.5 Cluster Acquisition in other Indian languages

Studies in Bengali, Hindi, and Tamil have shown that consonant clusters are gradually learned and associated with persistent error patterns including cluster reduction and epenthesis (Banik, 1988; Santhosh, 2001; Barathy, 2001).

2.6 Cluster Acquisition in Kannada

Although there is little research on consonant cluster acquisition in Kannada, it offers major insights into phonological development. According to Jayashree (1999), children with

typical development continue to experience cluster reduction until five years old, demonstrating the complexity of cluster development.

According to Rupela and Manjula's (2006) research on phonotactic development in Kannada-speaking children, cluster acquisition happens gradually. Initial clusters were less prevalent than medial clusters, which were shown to appear earlier and more frequently. Additionally, they noted that, in comparison to two-element clusters, three-element clusters occur less frequently and develop later.

Furthermore, just a few consonant clusters were learned by the age of four, according to Prathima and Sreedevi (2009), indicating delayed mastery of cluster creation. In the same way, Deepa and Savitri (2010) found that some clusters are not mastered by the age of six, indicating that cluster acquisition continues beyond early childhood.

Divyashree and Sreedevi (2018), in a study involving 180 typically developing participants, investigated the acquisition of non-geminate consonant clusters in Kannada. Initially, 52 consonant clusters were identified; however, three clusters were excluded due to variability associated with colloquial usage, resulting in the final analysis of 49 consonant clusters comprising 19 initial and 30 medial clusters. The authors used 54 familiar picture-nameable words, including selected English loanwords, to elicit consonant cluster productions. The majority of clusters were acquired between the ages of 3.6 and 6.0, indicating a steady developmental trajectory. Simpler two-element (CCV) clusters were typically learned before more complex three-element (CCCV) clusters, and medial clusters reached mastery before initial clusters. The most common error pattern was found to be cluster reduction, which typically used sonority-based simplification techniques. Medial clusters attained mastery earlier, perhaps because of their greater frequency in Kannada phonology, but certain beginning clusters continued to develop after the age of six. These results offer significant

developmental data for the error characteristics, complexity, and acquisition patterns of Kannada consonant clusters.

Marked structures, such as consonant clusters, require more planning and motor coordination; thus, are more difficult for children to learn and produce. This is so because clusters require more cognitive and articulatory effort to achieve a good execution; they are a more involved type of speech sounds to produce correctly and demand higher articulatory and cognitive control. As Gierut (2005) says, clusters are "marked structures" that develop later and were less stimulable in therapy. When producing consonant clusters children tend to simplify them and delete one sound as a process called cluster reduction, because of how difficult they are to pronounce.

2.6.1 Linguistic Structure of Kannada and Cluster Distribution

The Dravidian language family includes Kannada, which has a rich phonological inventory of vowels, diphthongs, and consonants. Certain cluster combinations are more prevalent than others because the phonotactic structure of the language limits the creation of consonant clusters. Sounds like /f/ and /z/ are typically present in loanwords in addition to native consonants, underscoring the impact of language interaction on the Kannada sound system (Sridhar, 1990).

A few phonotactic rules governs the formation of clusters in Kannada words. It has been reported that the number of consonant clusters are fewer at word initial positions and predominantly loan words and common in medial position (Hiremath,1961). In terms of the structure complexity two-element clusters are more prevalent than three-element clusters, and it's mostly found in internal position and four-element cluster are not common in spoken or fast speech.

Additionally, there are also some internal constraints to the combinations of consonants in clusters; there is not just any combination of possible consonant clusters but a specific set of

these combinations that is permissible in the language according to phonotactic constraints. These structural properties exemplify how a consonant cluster distribution is governed and how it functions in a systematic way in Kannada. These phonotactic properties are necessary in the present study in order to help the researcher decide which consonants would be clustered together and how they are grouped together to form a consonant cluster passage.

2.7 Reading Passages for Speech-Language Assessment

Passages are an important part of speech and language assessment because they allow us to hear how people talk in everyday contexts. In contrast to single words or brief sentences, connected passages promote more naturally occurring, flowing speech, providing us with a more comprehensive understanding of language use. They provide a valuable way of eliciting the sample while assessing fluency, articulation, prosody, and rate in natural and continuous speech. It also serves as a resource to analyse reading accuracy and language organisation within extended discourse. For this reason, standardised passages are widely used in fluency research and clinical practice.

Various reading passages have been reported in the literature for analysing speech in school-aged children and adults. In the Western context, studies such as Rae and Potter (1973) developed reading passages to assess the progressive acquisition of early reading skills. These passages were linguistically structured to increase in complexity and decrease in cohesion, allowing for graded evaluation of decoding and comprehension. Rather than targeting specific phonemes, the passages emphasised syntactic variation, lexical load, and genre shifts from narrative to expository forms (McAfee & Shipley, 2004). The passages such as Swimming (Kindergarten to the first-grade level), “Grandma is coming” (first grade to second grade), “Nicknames” (third grade to fourth grade), “The amazing spider” (third grade to fourth grade), and “The toothbrush” (fourth grade to sixth grade) have been developed. All of the consonant

phonemes of English are included in each passage, and these passages vary with respect to their graded complexity.

A range of reading passages compiled by Powell (2006) has been widely used to analyse adult speech in English across clinical and linguistic settings. Beginning with Your Rate of Oral Reading by Fairbanks (1940), this passage measures reading fluency and syntactic processing. The North Wind and the Sun passage (IPA, 1949) is often used as a standard for studying how people pronounce English. It includes nearly all the sounds in the language, making it helpful in comparing speech across speakers. The Rainbow passage (Fairbanks, 1960), available in short and long versions, is phonetically rich and includes all English consonant phonemes, making it ideal for assessing articulation and resonance. My Grandfather passage (Darley et al., 1975) uses personal narrative to encourage thoughtful, connected speech, whereas The Limpy Passage (Wilson & Rice, 1977) provides emotionally descriptive content that can be used to assess tempo and fluency. The Farm and The Hunter passages (Crystal & House, 1982) in English present descriptive and syntactically varied texts that assess natural speech rhythm. The Picnic and Trip to the Zoo passages (Wilson, 1987) reflect everyday situations and help bring out natural, conversational language. Comma Gets a Cure (Honorof, Cullough, & Somerville, 2000) was created to study dialects and includes a wide range of sounds and vocabulary. The Arthur the Rat passage (2006 version from American University in the Emirates) includes a balanced mix of sounds and is often used to study accents and how people pronounce words. Though not well recorded and with an unknown source, the Virginia Theatre passage is likely used to observe expressive speech and rhythm. These passages vary in lexical, phonetic, and structural complexity, making them suitable for evaluating adult speech performance across fluency, articulation, and prosody.

In India, however, relatively few studies have focused on developing reading passages for systematic speech and language assessment. Early efforts by Rathna and Bettagiri (1972)

involved the development of sections for identifying and diagnosing articulation problems in Kannada. Two screening passages were developed, each containing all Kannada phonemes except aspirated ones, which were excluded due to limited use by children. The passages comprised 59 words (180 syllables) and 45 words (138 syllables), respectively. One diagnostic passage included all phonemes, including aspirated sounds, and consisted of 43 words (184 syllables). Gayathri (1980) developed two Kannada reading passages to investigate phonatory behaviour in individuals who stutter. The first passage (combined passage) included a mix of voiced and unvoiced consonants, vowels, and diphthongs, while the second (voiced passage) contained only voiced phonemes. Both passages were selected from Kannada textbooks and linguistically structured to elicit controlled speech responses for clinical and research purposes. These stimuli enabled analysis of stuttering frequency, phonation onset, and the relationship between dysfluency types and phonemic context.

Shashidhar (1984) used 'combined' (Bengaluru passage) and a 'voiced passage' (Krishna Nadi) to analyse stuttering in Kannada adults; they are not designed for children or structured around phonological complexity. Later, Ramaa (1985), Loomba (1995), and Priyadarshi et al. (2012) utilized reading passages from children's textbooks to evaluate reading comprehension in Kannada and Hindi. Also, four 300-word passages were developed across various languages to assess the speaking abilities of adults, reading passages, such as 'Raviya nayi', 'Ranga mattu nayi', 'Kuri kayuva huguga', 'Aane, Kalla mattu avana nayi', 'Biraballana jaanatana', 'Chaadi maatu', 'Arasana tappu' (Prema, 1997), and every passage contained all the phonemes occurring in the Kannada language, used mainly to assess the reading comprehension, but lack standardisation and phonological control. Savithri and Jayaram (2004, 2005) designed 300-word passages to assess speech rates in four Dravidian languages: Tamil, Malayalam, Telugu, and Kannada. The passages were designed to include a balanced representation of Kannada phonemes. More recently, graded Kannada passages for children in Grades III–VII have been

developed and validated on large samples to measure reading accuracy, fluency, and rate (Sangeetha, 2018). Each passage contains all the phonemes of the Kannada language.

Although several Kannada reading passages have been developed to ensure comprehensive phonemic representation, none were specifically designed to systematically elicit consonant cluster production across varying levels of phonological complexity. However, relatively few studies have focused on creating structured reading passages in the Indian context. Although passages for articulation assessment were created in early Kannada research, phonological characteristics were not systematically controlled. Textbook portions that were not intended for phonological analysis were used in published research. There are not many resources that methodically alter consonant cluster complexity, despite the fact that certain graded passages have been created.

To summarise, the literature indicates that consonant cluster acquisition is a complex and prolonged process. Children progress through stages of development, beginning with non-adult productions such as cluster reduction and gradually achieving accurate adult-like productions. Studies indicate that mastery of certain complex consonant clusters may extend into later childhood, with some reports suggesting development up to 9–12 years of age and is influenced by factors such as cluster position and structural complexity. Simpler clusters are typically acquired earlier, and acquisition patterns vary across languages due to differences in phonotactic structures.

In the Kannada context, available studies are limited; however, Divyashree and Sreedevi (2018) reported that cluster acquisition follows a steady developmental pattern, with most clusters being acquired between 3.6 and 6.0 years. The study also found that medial clusters are mastered earlier than initial clusters, and cluster reduction is the most common error pattern.

Despite these findings, there is a lack of research focusing on the development of structured materials incorporating consonant clusters in Kannada. Furthermore, existing Kannada reading passages primarily emphasize phonemic representation and reading performance, with limited attention to consonant cluster distribution and complexity. This highlights the need for the development of standardized consonant cluster passages in Kannada. Therefore, the present study aims to address this gap by developing consonant cluster passages in Kannada.

CHAPTER III

METHOD

The present study aimed to develop and validate consonant cluster passages for school-aged children and adults in Kannada. The passages were designed to incorporate age- and educationally appropriate consonant cluster words with varying levels of phonological and linguistic complexity. Specifically, separate passages were developed for primary-level children, secondary-level children, and adults aged 18 years and above. A cross-sectional descriptive study design was employed, and the study was carried out in three phases: (a) development of consonant cluster passages in Kannada, (b) content validation of the developed passages, and (c) validation of applicability and preliminary clinical validation.

3.1 Objectives of the Study

The objectives of the present study were:

1. To identify consonant cluster words in Kannada and validate their familiarity among Kannada-speaking school-aged children and adults through expert evaluation.
2. To develop three sets of connected Kannada passages incorporating consonant cluster words with varying levels of linguistic complexity for primary-level children, secondary-level school children, and adults.
3. To establish the content validity of the developed passages through expert review with respect to ambiguity, cultural appropriateness, representativeness, and clarity.
4. To evaluate the applicability and usability of the developed passages by administering them to participants across the primary, secondary level children and the adult population.
5. To conduct preliminary clinical validation of the developed passages by administering them to individuals with speech disorders.

3.2 Research Design

A cross-sectional descriptive study design was used to develop and validate consonant cluster passages in Kannada across three educational levels. The study further examined the applicability and preliminary clinical usefulness of the developed passages in typically developing individuals and individuals with speech disorders.

3.3 Participants

Participants were recruited across three participant levels: primary-level children (8–12 years), secondary-level school children (13–17 years), and adults (18 years and above). A total of 51 participants were included in the study, comprising typically developing individuals as well as individuals with speech disorders. Each level consisted of 17 participants distributed across the typically developing, stuttering, and speech sound disorder groups.

3.3.1 Clinical Group (n = 7 per participant level)

The clinical group at each participant level included 7 participants, comprising 4 individuals with stuttering and 3 individuals with speech sound disorders, including participants with associated maxillofacial anomalies.

3.3.2 Control Group (n = 10 per participant level)

The control group comprised typically developing individuals with no reported history of speech, language, or hearing disorders.

3.4 Participant Selection Criteria

3.4.1 Inclusion Criteria

Participants were required to:

(a) fall within the specified age range

(b) be native Kannada speakers or Kannada-dominant bilingual speakers

(c) be literate and able to read Kannada fluently

(d) have normal or corrected-to-normal vision

(e) have no reported history of hearing impairment, and neurological, cognitive, or developmental conditions that could affect speech or language performance; and

(f) in the case of clinical participants, have a confirmed diagnosis of a speech disorder by a certified speech-language pathologist.

3.4.2 Exclusion Criteria

Participants in control group were excluded if they presented with:

- History of language disorders
- Neurological disorders affecting speech or reading performance
- Intellectual disabilities affecting task performance
- Psychological disorders affecting communication
- Uncorrected visual impairments interfering with reading ability

3.5 Procedure

The study was carried out in three phases as follows:

- Phase I: Development of consonant cluster passages in Kannada
- Phase II: Content validation of the developed passages
- Phase III: Validation of applicability and preliminary clinical validation

3.5.1 Phase I: Development of Consonant Cluster Passages in Kannada

Phase I involved corpus compilation, familiarity validation of consonant cluster words, and development of consonant cluster passages in Kannada for different participant levels.

3.5.1.1 Corpus Compilation and Selection of Consonant Cluster Words.

Consonant cluster words were compiled separately for primary-level children, secondary-level children, and adults from various linguistic, educational, and literary sources. Words were extracted for primary-level corpus from Kannada textbooks, story books, rhymes,

corpus developed by Divyashree (2018) and related works on children language development. Words for the secondary-level corpus were gathered from Kannada textbooks intended for older children, magazines and other reading material for the children's age group. For the adult-corpus, words were picked up from newspaper, magazines, story books and miscellaneous books in Kannada. The loanwords extensively used in Kannada have been added as they are also found to contain consonant cluster structure and hence relevant for phonological analysis. All the compiled corpora were reviewed individually for each level of education for suitability and phonetic intelligibility in the context of each education level. The criteria applied for the selection of words included familiar, commonly used, easily comprehensible, natural occurrence, naturally used, and spoken or written Kannada words. For the corpus for primary level, special attention was given for the comprehensibility and the ease with which a child can pronounce the words. Complicated, foreign, low frequency, or rare words were removed from the particular corpora. Finally, the resulting word lists were validated for familiarity by expert review.

3.5.1.2 Content Validation of Cluster words

The compiled consonant cluster word lists were presented to a panel of six experts consisting of:

- Three speech-language pathologists with more than two years of clinical experience
- One linguist specialized in Kannada phonology
- Two Kannada teachers with more than two years of teaching experience

Experts rated each word for familiarity and educational appropriateness using a structured rating scale. Expected words for the primary level corpus were supposed to be easy, known and familiar in common speech of children, textbooks and story books. The expected words for secondary level corpus were supposed to be known, familiar, meaningful and age appropriate and common in children's textbooks and general writings. The expected words for

adult's corpus were supposed to be familiar, meaningful, naturally spoken and written in conversations. Only the words which have got a consensus from the experts about familiarity and appropriateness to 75% experts were included for the development of final consonant cluster passages in Kannada. The expert rating scale for the clusters' familiarity is given in Table 3.1.

Table 3.1

Expert Rating Scale for Cluster Familiarity

Parameter	Primary-Level Children	Secondary-level children	Adults
Cluster Familiarity/Frequency	The word is simple, familiar, and commonly encountered in children's everyday speech, textbooks, and storybooks.	The word is meaningful, age-appropriate, and commonly encountered in academic and general reading materials.	The word is meaningful, relevant, and naturally occurring in spoken and written communication.

3.5.1.3 Passage Development

Using the compiled lists of consonant cluster words, three Kannada consonant cluster passages were constructed for children of primary, secondary levels and adults. Contextual and syntactically sound sentences incorporating the chosen consonant cluster words were devised keeping the passages easy to read, coherent and thematically sound as well as semantically and linguistically natural for each group. The formulated sentences were put together to formulate a connected passage approximately 100-150 words long. Passages at each level were designed to gradually increase phonological and linguistic complexity. Although an attempt was made to include as wide a range of consonant cluster structures as possible, inclusion of all reported Kannada consonant clusters was not possible due to factors of word familiarity, meaning and grammatical validity of sentences and passage flow.

The word choices for the primary level passage focused mostly on very common, everyday consonant cluster words often used in everyday communication for children, textbooks and children's books. Moderately complex consonant cluster words that might occur for the child at an academic and linguistic level appropriate for children's communication experiences were chosen for the secondary level passage. Adult communication language in the context of reading and writing was taken into account and relatively complex consonant cluster words that adults encounter in their communication styles were used in the adult passage. It was attempted to keep all passage lengths similar between the participant levels but also make them developmentally and linguistically appropriate. Attention was given to maintaining linguistic naturalness and sufficient consonant cluster structure presence in each passage.

The developed passages were further analyzed with respect to the total number of words, total number of consonant clusters, distribution of geminate and non-geminate clusters, and cluster complexity (two-element, three-element, and four-element clusters) to ensure a systematic progression of phonological complexity across the three participant levels.

3.5.2 Phase II: Content Validation of the Developed Passages

The developed consonant cluster passages in Kannada for primary-level children (8–12 years), secondary-level children (13–17 years), and adults (18 years and above) were subjected to content validation through expert review to evaluate ambiguity, cultural appropriateness, clarity, and representativeness.

The content validity of the stimuli was tested using a panel of eleven judges: Five speech-language pathologists with at least two years of clinical experience, a linguist with specialization in Kannada phonology, and five Kannada teachers with at least two years of experience. The judges were asked to rate each passage on a four-point Likert scale on its level of ambiguity, cultural relevancy, intelligibility and representativeness. The experts were also

instructed to provide suggestions for modification wherever necessary. Appropriate modifications suggested during expert review were incorporated prior to finalization of the passages. Table 3.2 presents the expert validation criteria.

Table 3.2

Expert Validation Criteria

Parameters	0	1	2	3
Ambiguity	The item is highly ambiguous	The item requires revision	The meaning is mostly clear but needs minor revision	The meaning of the item is clear
Cultural Appropriateness	Inappropriate	The item requires revision	Appropriate but needs minor revision	Highly appropriate
Clarity	Item clarity is poor	The item requires revision	Clear but needs minor revision	Item clarity is good
Representativeness	Not representative of the intended content	The item requires revision	Representative but needs some revision	Highly representative

3.5.3 Phase III: Validation of Applicability and Preliminary Clinical Validation

The finalized passages were administered to typically developing Kannada-speaking participants across the three participant levels to validate applicability and usability. Subsequently, the passages were administered to individuals with stuttering and individuals with speech sound disorders to examine preliminary clinical usefulness. Reading samples were analyzed with respect to correct word production, total reading errors, reading accuracy, correct consonant cluster production, consonant cluster errors, consonant cluster accuracy, and reading time. Dysfluency types and speech error patterns were also documented for the clinical groups. Audio recordings were obtained for all participants under quiet conditions.

3.6 Ethical Considerations

This study was approved by the Institutional Review Board (IRB) for Bio-behavioral research proposal involving human subjects, constituted by the AIISH

Ethical committee, with the reference number SH/IRB/M.5/SLP.40/2025-26 (Appendix E). All ethical standards were met for participant selection and participation. Prior to the testing, informed consent was obtained from the adult participants or the parents/caregivers of child participants after explaining the purpose and procedure of the study

3.7 Administration Procedure

Each participant was tested individually in a quiet room. Participants were seated comfortably in front of the examiner. Initially, the tester conversed with the child to make him/her comfortable during testing. The reading material was placed on the table or given to the participants, and each of the participants was given his/her grade appropriate passage. Participants were instructed to read the passage aloud at a comfortable rate, loudness, and pitch. Adequate time was provided for reading the passage.

All speech samples were audio-video recorded for further analysis using a mobile recording device with adequate recording quality. The recording device was positioned approximately 50–60cm from the participant's mouth at mouth level in order to ensure optimal recording quality.

In situations where participants hesitated for more than five seconds while reading a word, the word was noted as a difficult item. The examiner then provided the target word and instructed the participant to continue reading.

The recorded speech samples were subsequently analysed with respect to:

- Correct word production
- Total reading errors
- Reading accuracy
- Correct consonant cluster production
- Consonant cluster errors
- Consonant cluster accuracy

- Dysfluencies/ Speech error patterns
- Reading time

3.7.1 Scoring and Analysis

The obtained reading samples were analysed with respect to:

- Correct word production
- Total reading errors
- Reading accuracy percentage
- Correct consonant cluster production
- Consonant cluster errors
- Consonant cluster accuracy percentage
- Reading time

Reading accuracy percentage was calculated using the following formula:

$$\text{Reading Accuracy (\%)} = \frac{\text{Number of Correctly Read Words}}{\text{Total Number of Words}} \times 100$$

Consonant cluster accuracy percentage was calculated using the following formula:

$$\text{Cluster Accuracy (\%)} = \frac{\text{Number of Correctly Produced Clusters}}{\text{Total Number of Clusters}} \times 100$$

Self-corrected productions were scored as correct responses if the participant independently produced the target word accurately without examiner assistance. Although occasional hesitations and self-corrections were observed during passage reading, these were not considered reading errors when the final production was accurate.

For individuals with stuttering, dysfluencies such as repetitions, prolongations, and blocks were additionally documented and analysed. For individuals with speech sound disorders, speech error patterns including cluster reduction/simplification, substitution, distortion, and nasalization were analysed. The obtained scores were tabulated separately for primary-level participants, secondary-level participants, and adults across typically developing and clinical populations for further statistical analysis.

3.8 Statistical Analysis

The obtained data were analyzed using Statistical Package for Social Sciences (SPSS) software, version 26. Expert ratings obtained during familiarity validation were reviewed using the predetermined agreement criterion of 75%. Content validation ratings obtained during expert review were analysed using Content Validity Index (CVI).

Descriptive statistics including mean, standard deviation, frequency, and percentage were computed for reading accuracy, consonant cluster accuracy, cluster errors, and reading time across all participant groups. Dysfluency measures were additionally analyzed for individuals with stuttering, whereas speech error patterns were analyzed for individuals with speech sound disorders.

CHAPTER IV
RESULTS

The objectives of the present study were to identify and validate consonant cluster words in Kannada, develop consonant cluster passages for primary-level children, secondary-level children, and adults in Kannada, and examine the applicability and preliminary clinical usefulness of the developed passages in typically developing individuals and individuals with speech disorders.

Descriptive statistics were used to compute means, standard deviations, frequencies, and percentages for the obtained data. A predetermined agreement criterion of 75% was used for familiarity validation of consonant cluster words, while the Content Validity Index (CVI) was computed for content validation of the developed passages.

The results of the present study are presented under the following sections: (a) participant distribution, (b) familiarity validation of consonant cluster words in Kannada, (c) development of consonant cluster passages in Kannada, (d) content validation of the developed passages, (e) validation of applicability and usability in the typically developing population, and (f) preliminary clinical validation in individuals with speech disorders.

4.1 Participant Distribution

The distribution of participants across the typically developing and clinical groups is presented in Table 4.1. Detailed demographic information is provided in Appendix D.

Table 4.1

Distribution of Participants Across Study Groups

Group	n	Mean Age (Years)	Age Range
Typically developing group– primary-level	10	10	8–12 years
Typically developing group – secondary-level	10	15	13–17 years
Typically developing group – adult level	10	32.2	18 years and above

Stuttering group – primary-level	4	11.0	8–12 years
Stuttering group – secondary-level	4	14.25	13–17 years
Stuttering group – adult level	4	27.0	18 years and above
SSD group – primary-level	3	10.0	8–12 years
SSD group – secondary-level	3	14.0	13–17 years
SSD group – adult level	3	53.0	18 years and above

Note. SSD = Speech Sound Disorder. Typically developing group total $n = 30$; Stuttering group total $n = 12$; SSD group total $n = 9$.

The typically developing population consisted of 30 participants distributed equally across the three participant levels. The stuttering group consisted of 12 participants, while the speech sound disorder group consisted of 9 participants distributed across the respective participant levels. The participant groups represented the intended primary-level, secondary-level, and adult age ranges included in the study. The detailed participants demographic is given in A

4.2 Familiarity Validation of Consonant Cluster Words in Kannada

Consonant cluster words compiled from various educational and literary sources were subjected to expert evaluation to determine familiarity and appropriateness for the intended educational levels and adult population. A total of 461 consonant cluster words compiled from school-level sources and 650 consonant cluster words compiled from adult sources were reviewed by the expert panel. The school-level words were further classified according to their suitability for primary-level children and secondary-level children.

Words achieving a minimum agreement of 75% among experts were retained for passage development. High agreement was obtained among experts regarding the familiarity

and appropriateness of the selected consonant cluster words. The retained word lists were subsequently used for the development of the consonant cluster passages in Kannada.

The distribution of compiled consonant cluster words is presented in Table 4.2.

Table 4.2

Distribution of Compiled Consonant Cluster Words

Source Category	Number of Words
School-Level Corpus	461
Adult Corpus	650
Total	1111

Note. The school-level corpus was further classified by experts according to suitability for primary-level children and secondary-level children.

4.3 Development of Consonant Cluster Passages in Kannada

4.3.1 Frequency Distribution of Consonant Clusters

Based on the finalized consonant cluster word lists, three consonant cluster passages in Kannada were developed for primary-level children, secondary-level children, and adults. The distribution of words and consonant clusters across the developed passages is presented in Table 4.3.

Table 4.3

Distribution of Words and Consonant Clusters Across Developed Passages

Passage	Total Words	Total Consonant Clusters
P1 – Primary-level	115	36
P2 – Secondary-level	138	80
P3 – Adult level	150	108

Note. P = Passage.

The frequency distribution of consonant clusters was analyzed to examine the representation of consonant cluster structures within the developed passages. Passage 1

(Primary-level) contained 36 consonant cluster occurrences distributed across 115 words. Frequently occurring clusters included /pr/, /sk/, and /kʂ/, which represented simple and familiar consonant cluster combinations commonly encountered in educational and everyday communication contexts.

Passage 2 (Secondary-level) contained 80 consonant cluster occurrences within 138 words. The passage demonstrated greater cluster diversity compared to Passage 1, with frequently occurring clusters including /rj/, /kr/, /pr/, /kʂ/, /sw/, and /tr/. Several moderately complex cluster combinations were also incorporated to reflect the increased linguistic and reading demands associated with this educational level.

Passage 3 (Adult level) contained the highest number of consonant cluster occurrences (108) distributed across 150 words. Frequently occurring clusters included /pr/, /d͡ʒɲ/, /kʂ/, /ʂʈʰ/, /dja:/, and /ʊj/. The passage also incorporated a wider range of complex cluster combinations occurring in multisyllabic and advanced vocabulary items commonly encountered in adult communication and reading materials.

Overall, the three passages showed a systematic progression in phonological complexity as the quantity, frequency, and variety of consonant cluster patterns grew over time. Simple and well-known consonant cluster structures that are frequently seen in children's ordinary speech, textbooks, and storybooks were inserted into the primary-level passage. While the adult-level passage included relatively complex consonant cluster combinations and multisyllabic words frequently found in adult communication, reading, and writing, the secondary-level passage included somewhat complex consonant cluster combinations suitable for children's linguistic and academic exposure. The distribution maintained linguistic and developmental appropriateness across participant levels while guaranteeing sufficient representation of frequently occurring Kannada consonant clusters.

In addition to the total number of words and consonant clusters, the developed passages were further analyzed with respect to the distribution of non-geminate and geminate consonant clusters, as well as cluster complexity. The analysis examined the number of words containing only non-geminate clusters, only geminate clusters, and both cluster types, together with the frequency of two-element, three-element, and four-element consonant cluster occurrences across the three passages. This analysis was undertaken to ensure a systematic progression in phonological complexity across the passages developed for different participant levels.

The number of words containing non-geminate clusters increased progressively from 33 in Passage 1 to 67 in Passage 2 and 78 in Passage 3. Similarly, the number of words containing geminate clusters increased from 33 in Passage 1 to 39 in Passage 2 and 43 in Passage 3. The number of words containing both non-geminate and geminate clusters also increased across the passages, indicating a gradual increase in phonological complexity, as shown in Table 4.4.

Table 4.4

Distribution of Words Containing Non-Geminate and Geminate Clusters Across the Developed Passages

Feature	Passage 1	Passage 2	Passage 3
Total words	115	138	150
Words containing only non-geminate clusters	26	56	59
Words containing only geminate clusters	26	28	24
Words containing both non-geminate and geminate clusters	7	11	19
Total words containing non-geminate clusters	33	67	78
Total words containing geminate clusters	33	39	43

Passage 1 contained 36 non-geminate cluster occurrences, all of which were two-element clusters. Passage 2 contained 80 non-geminate cluster occurrences, comprising 73 two-element clusters and 7 three-element clusters. Passage 3 contained 108 non-geminate cluster

occurrences, including 102 two-element clusters and 6 three-element clusters. No four-element clusters were identified in any of the passages. These findings demonstrate that the phonological complexity of the passages increased systematically across age levels through the inclusion of a greater number of cluster-containing words and more complex consonant cluster structures, as shown in Table 4.5.

Table 4.5

Distribution of Consonant Cluster Occurrences Across the Developed Passages

Feature	Passage 1	Passage 2	Passage 3
Total non-geminate cluster occurrences	36	80	108
2-element clusters	36	73	102
3-element clusters	0	7	6

The inclusion of three-element clusters in Passages 2 and 3 further contributed to the progression of phonological complexity across the developed passages.

4.4 Content Validation of the Developed Passages

The developed consonant cluster passages in Kannada were subjected to content validation through expert review by a panel of 11 experts comprising five speech-language pathologists, five Kannada language teachers, and one linguist. Experts rated each passage on four parameters ambiguity, cultural appropriateness, clarity, and representativeness using a four-point Likert scale ranging from 0 (*not appropriate*) to 3 (*highly appropriate*). Ratings of 2 and 3 were considered indicative of content relevance. Content Validity Index was computed as the proportion of experts assigning a rating of 2 or 3 for each parameter. The content validation ratings are presented in Table 4.6.

Table 4.6

Content Validity Index Values of the Developed Consonant Cluster Passages in Kannada

Passage	Ambiguity	Cultural Appropriateness	Clarity	Representativeness
Passage 1 (Primary-level)	1.0	1.0	1.0	1.0
Passage 2 (Secondary-level)	1.0	1.0	1.0	1.0
Passage 3 (Adult level)	1.0	1.0	1.0	1.0

Note. CVI = Content Validity Index, computed as the proportion of experts (N = 11; five speech-language pathologists, five Kannada language teachers, one linguist) assigning a rating of 2 or 3 on a four-point Likert scale (0 = not appropriate, 1 = slightly appropriate, 2 = appropriate, 3 = highly appropriate). A CVI of 1.0 indicates all experts rated the item as appropriate or highly appropriate.

The CVI values obtained for all three passages across the four evaluated parameters are presented in Table 4.6. All three passages achieved a CVI of 1.0 for ambiguity, cultural appropriateness, clarity, and representativeness, indicating complete agreement among the experts regarding the suitability of the passages. All 11 experts rated the passages within the acceptable range for each parameter.

To further examine the distribution of expert ratings, the frequency of ratings assigned under the categories “appropriate” (rating = 2) and “highly appropriate” (rating = 3) was calculated for each passage and parameter. The distribution of expert ratings is presented in Table 4.7. No ratings of 0 (not appropriate) or 1 (slightly appropriate/requires revision) were assigned by any expert for any of the evaluated parameters.

Table 4.7

Distribution of Expert Ratings for the Developed Passages (N = 11)

Parameter	Passage 1		Passage 2		Passage 3	
	Rating 2	Rating 3	Rating 2	Rating 3	Rating 2	Rating 3
Ambiguity	2	9	2	9	1	10
Cultural Appropriateness	0	11	0	11	2	9
Clarity	3	8	3	8	0	11
Representativeness	2	9	1	10	1	10

Note. Rating 2 = Appropriate; Rating 3 = Highly Appropriate.
The distribution of ratings revealed that all expert ratings fell within the acceptable range (ratings of 2 or 3) across ambiguity, cultural appropriateness, clarity, and representativeness for all three passages. The majority of ratings were in the highly appropriate category (rating = 3), indicating strong expert agreement regarding the suitability of the developed passages.

Although all three passages achieved a CVI of 1.0 across the evaluated parameters, the experts provided several qualitative suggestions to further refine the passages. These suggestions primarily related to punctuation, sentence restructuring, lexical modifications, grammatical refinement, and improvement of passage coherence. The specific suggestions provided by the experts and the corresponding modifications incorporated into the final versions of the passages are presented in Table 4.8.

Table 4.8
Suggestions Provided by Experts and Modifications Incorporated Following Content Validation

Passage	Suggestion Provided by Experts	Modification Incorporated
Passage 1	Include appropriate punctuation marks.	Appropriate punctuation marks were incorporated throughout the passage.
Passage 1	Use filler/connective words to improve the meaningfulness and continuity of the passage.	Connective words such as (āmēle), (nantara), and (alliyē) were incorporated to improve the flow and coherence of the passage.
Passage 1	Improve sentence connectivity and syntactic organization.	Minor revisions were made to sentence structure and sequencing to enhance grammatical flow and connectivity.
Passage 2	Include an additional sentence related to flag hoisting to better reflect the theme of Independence Day and incorporate the consonant cluster word (dhvaja).	An additional sentence describing flag hoisting was incorporated using the target consonant cluster word (dhvaja).
Passage 2	Restructure certain sentences for better organization and readability.	Relevant sentences were reorganized and revised without altering the intended content.
Passage 2	Replace the unfamiliar word (gāḷicakra).	The word (gāḷicakra) was replaced with a more familiar and contextually appropriate consonant cluster word.

Passage 2	Replace (svātantradinadandu) with (svātantrya dināचaraṇe).	The suggested lexical modification was incorporated in the final version of the passage.
Passage 3	Add the honorific (śrī) before (kṛiṣṇa).	The term (śrī kṛṣṇa) was incorporated in the passage.
Passage 3	Replace (spaṣṭapaḍisalāyitu) with (spaṣṭapaḍisidaru).	The suggested lexical modification was incorporated to improve naturalness and contextual appropriateness.
Passage 3	Replace (kalpane) with (parikalpane).	The word (parikalpane) was incorporated to better suit the context.
Passage 3	Modify words such as (saṃskṛti) and (granthālaya) to improve grammatical linkage and coherence.	The words were modified to (saṃskṛtiya) and (granthālayada), respectively.
Passage 3	Improve connectivity between sentences.	Minor revisions were made to enhance coherence and continuity across the passage.

The obtained CVI values, together with the favourable distribution of expert ratings and the incorporation of expert suggestions, indicate excellent content validity and strong agreement among experts. These findings support the linguistic appropriateness, cultural relevance, clarity, and representativeness of the developed consonant cluster passages in Kannada across the targeted educational and adult levels. After incorporating the suggestions provided by the expert panel, the revised versions of the passages were finalized and are presented in Appendix A, B, C.

4.5 Validation of Applicability and Usability in the Typically Developing Population

The finalized passages were administered to typically developing Kannada-speaking participants across the primary-level, secondary-level, and adult level. Reading samples were analyzed with respect to correct word production, total reading errors, reading accuracy, correct consonant cluster production, consonant cluster errors, consonant cluster accuracy, and reading time. The results are presented in Table 4.9.

Table 4.9
Mean ± Standard Deviation Values of Reading Performance in the Typically Developing Population

Parameter	P1 M ± SD	P2 M ± SD	P3 M ± SD
Correct Word Production	114.8 ± 0.42	138 ± 0	150 ± 0
Total Reading Errors	0.2 ± 0.42	0 ± 0	0 ± 0
Reading Accuracy (%)	99.83 ± 0.37	100 ± 0	100 ± 0
Correct Consonant Cluster Production	35.8 ± 0.63	80 ± 0	108 ± 0
Consonant Cluster Errors	0.2 ± 0.63	0 ± 0	0 ± 0
Consonant Cluster Accuracy (%)	99.44 ± 1.76	100 ± 0	100 ± 0
Reading Time (min)	2.09 ± 0.92	1.47 ± 0.14	1.69 ± 0.29

Note. P = Passage; M = Mean; SD = Standard Deviation.

Typically developing participants demonstrated near-ceiling performance across all three passages. In Passage 1, the mean reading accuracy was 99.83% (SD = 0.37) and the mean consonant cluster accuracy was 99.44% (SD = 1.76), whereas participants in Passages 2 and 3 demonstrated 100% reading accuracy and 100% consonant cluster accuracy. A small number of reading and consonant cluster production errors were observed among primary-level participants, while no such errors were observed in the secondary-level participants or adult groups. Overall, participants accurately produced the target consonant cluster words included in the passages.

Although accuracy remained nearly high across all participant groups, differences were observed in reading time. Primary-level participants required comparatively longer reading times (2.09 ± 0.92 min) than secondary-level participants (1.47 ± 0.14 min) and adults (1.69 ± 0.29 min).

Table 4.10
Words Associated with Hesitation/Self-Correction During Passage Reading

Passage	Words Associated with Hesitation/Self-Correction	Target Consonant Cluster(s)
Passage 1	/skuːʈər/, /krɪkəʈ/, /kuɾt͡ʃi/, /ʃəɾʈ/	/sk/, /kr/, /rt͡ʃ/, /rʈ/
Passage 2	/səmaːʊəstrə/, /suɖəɾʃənə/, /mukjoːpaːɖjaru/, /paːlgoɳɖu/	/str/, /ɖrʃ/, /kj/, /lg/
Passage 3	/kʂiprə/, /səɖgəʈi/, /sʊəʊikaːsə/, /ɖʊənɖʊaːʈməkə/	/kʂ/, /ɖg/, /sʊ/, /ɖʊ/, /nɖʊ/, /ʈm/

As shown in Table 4.10, hesitations in Passage 1 were primarily observed for English loanwords such as /skuːʈər/ and /krɪkəʈ/. In Passage 2, hesitations were associated with multisyllabic words containing relatively complex consonant clusters, whereas in Passage 3 hesitations occurred predominantly for words containing multiple cluster combinations such as /ɖʊ/, /nɖʊ/, and /ʈm/. These findings further support the graded increase in phonological complexity across the developed passages.

Relatively complex consonant clusters, multisyllabic constructions, or less common lexical elements were typically found in words linked to hesitations and self-corrections. In the end, though, every participant correctly generated these words and the consonant clusters that corresponded to them. Therefore, rather than challenges in producing consonant clusters, the observed hesitations seem to reflect disparities in reading fluency and lexical familiarity.

The majority of the words in the primary-level word list were easy to understand, well-known consonant cluster patterns that are often used in everyday and educational communication contexts. This strategy is in line with developmental studies (Divyashree & Sreedevi, 2018; Rupela & Manjula, 2006; Stoel-Gammon, 1987) that show earlier learning of simpler consonant cluster patterns during phonological development. The current study reduced the possibility of floor effects during administration and guaranteed that the materials

were suitable for children at the primary school level by choosing phonologically accessible and contextually familiar words.

Overall, the findings indicate that the developed passages were linguistically appropriate, readable, and clinically applicable for Kannada-speaking individuals across the primary, secondary-level, and adult levels. The consistently high reading accuracy and consonant cluster accuracy observed across participant groups support the usability of the developed passages for assessing consonant cluster production in typically developing Kannada speakers.

4.6 Preliminary Clinical Validation in Individuals with Speech Disorders

The developed consonant cluster passages in Kannada were further administered to individuals with speech disorders in order to examine the preliminary clinical usefulness of the developed passages. Clinical validation was carried out separately in individuals with stuttering and individuals with speech sound disorders.

4.6.1 Preliminary Clinical Validation in Individuals with Stuttering

The developed passages were administered to individuals with stuttering in order to examine dysfluencies associated with consonant cluster production during connected speech reading tasks.

The mean and standard deviation values of reading performance in individuals with stuttering are presented in Table 4.11.

Table 4.11

Mean ± Standard Deviation Values of Reading Performance in Individuals with Stuttering

Parameter	P1 M ± SD	P2 M ± SD	P3 M ± SD
Correct Word Production	114.25 ± 1.50	138 ± 0	150 ± 0
Total Reading Errors	0.75 ± 1.50	0 ± 0	0 ± 0
Reading Accuracy (%)	99.33 ± 1.35	100 ± 0	100 ± 0
Correct Consonant Cluster Production	35.25 ± 1.50	80 ± 0	108 ± 0
Consonant Cluster Errors	0.75 ± 1.50	0 ± 0	0 ± 0
Consonant Cluster Accuracy (%)	97.90 ± 4.20	100 ± 0	100 ± 0
Dysfluencies in Clusters	10.25 ± 5.12	11.00 ± 11.70	6.00 ± 4.24
Reading Time (min)	3.01 ± 1.01	2.34 ± 0.64	2.38 ± 0.07

Note. P = Passage; M = Mean; SD = Standard Deviation. Individuals with stuttering demonstrated high word-level and consonant cluster accuracy across passages, although a small number of reading and consonant cluster errors were observed in Passage 1. Dysfluencies reflect fluency breakdowns (e.g., repetitions and blocks) rather than phonemic substitution errors.

Table 4.12

Frequency Distribution of Dysfluency Types in Individuals with Stuttering

Dysfluency Type	Frequency	Percentage (%)
Repetition	8	57.14
Blocks	4	28.57
Repetition with Blocks	2	14.29

Note. Multiple dysfluency types were observed in certain participants.

Repetitions and blocks were the predominant dysfluency types observed during consonant cluster reading tasks. Reading time was greater in the stuttering group compared to the typically developing group across all passages, reflecting reduced fluency during connected speech reading. Dysfluencies were observed across all three passages, indicating that consonant

cluster production during connected speech reading may pose additional fluency demands for individuals with stuttering.

The findings suggest that consonant cluster production during connected speech reading may contribute to increased dysfluencies in individuals with stuttering. The developed consonant cluster passages in Kannada therefore appear clinically useful in eliciting and documenting dysfluencies associated with consonant cluster production.

4.6.2 Preliminary Clinical Validation in Individuals with Speech Sound Disorders

The developed consonant cluster passages in Kannada were also administered to individuals with speech sound disorders in order to examine consonant cluster production errors during connected speech reading.

The obtained reading samples were analyzed with respect to reading accuracy, consonant cluster accuracy, consonant cluster errors, speech error patterns, and reading time.

The mean and standard deviation values of reading performance in individuals with speech sound disorders are represented in Table 4.13.

Table 4.13

Mean ± Standard Deviation Values of Reading Performance in Individuals with Speech Sound Disorders

Parameter	P1 M ± SD	P2 M ± SD	P3 M ± SD
Correct Word Production	85.67 ± 8.14	119.00 ± 2.65	129.33 ± 10.07
Total Reading Errors	29.33 ± 8.14	19.00 ± 2.65	20.67 ± 10.07
Reading Accuracy (%)	74.00 ± 7.00	86.33 ± 2.52	86.00 ± 6.56
Correct Consonant Cluster Production	21.67 ± 2.89	61.67 ± 0.58	85.33 ± 11.68
Consonant Cluster Errors	17.33 ± 2.89	18.33 ± 0.58	22.67 ± 11.68
Consonant Cluster Accuracy (%)	55.33 ± 7.51	76.67 ± 0.58	78.33 ± 10.50
Reading Time (min)	3.67 ± 1.67	1.94 ± 0.56	2.82 ± 0.50

Note. P = Passage; M = Mean; SD = Standard Deviation; SSD = Speech Sound Disorder.

The frequency distribution of speech error patterns observed during passage reading is presented in Table 4.14.

Table 4.14

Frequency Distribution of Speech Error Patterns in Individuals with Speech Sound Disorders

Speech Error Pattern	Frequency	Percentage (%)
Cluster Reduction/Simplification	6	54.55
Substitution	3	27.27
Distortion	2	18.18
Nasalization	2	18.18

The findings demonstrated that individuals with speech sound disorders showed comparatively reduced reading accuracy and consonant cluster accuracy across all the passages when compared to the typically developing population.

Participants demonstrated increased consonant cluster errors and reduced correct consonant cluster production during connected speech reading tasks. Cluster reduction or simplification was observed as the most frequently occurring speech error pattern followed by substitution errors.

Distortion and nasalization were also observed in a few participants during consonant cluster production.

The findings suggest that the developed consonant cluster passages in Kannada are clinically useful in identifying consonant cluster production difficulties and associated speech error patterns in individuals with speech sound disorders.

CHAPTER V

DISCUSSION

The present study was undertaken with the primary aim of developing and validating consonant cluster passages in Kannada for school-aged children and adults. Specifically, separate passages were developed for primary-level children, secondary-level children, and adults. In addition, the study sought to examine the applicability and preliminary clinical utility of the developed passages in typically developing individuals as well as in individuals with stuttering and speech sound disorders. The findings are discussed in relation to relevant theoretical frameworks, existing empirical evidence, and the broader context of speech-language assessment research.

5.1 Familiarity Validation of Consonant Cluster Words in Kannada

Across all three educational levels, high levels of expert agreement were found about the appropriateness and familiarity of the chosen consonant cluster words; all retained words met predefined 75% agreement requirement. Because unfamiliar lexical words may make it difficult to evaluate speech production performance, this finding supports the commonly held belief in speech-language assessment research that word familiarity is a significant factor determining assessment validity (Storkel, 2004). Instead of actual phonological or motor speech deficits, the use of low-frequency or lexically unfamiliar words may result in speech problems caused by restricted lexical access or decoding challenges (Vitevitch & Luce, 1999). As a result, the expert validation process used in this work was a crucial methodological step in guaranteeing the suitability of the chosen stimuli.

The majority of the words in the primary-level word list were easy to understand, well-known consonant cluster patterns that are often used in everyday and educational communication contexts. This strategy is in line with developmental studies (Divyashree & Sreedevi, 2018; Rupela & Manjula, 2006; Stoel-Gammon, 1987) that show earlier learning of

simpler consonant cluster patterns during phonological development. The current study reduced the possibility of floor effects during administration and guaranteed that the materials were suitable for children at the primary school level by choosing phonologically accessible and contextually familiar words.

The secondary-level and adult word lists, on the other hand, had multisyllabic structures and relatively complicated consonant cluster combinations. This was meant to represent the wider linguistic exposure linked to rising academic standards, social interactions, and reading ability at higher educational levels. The three-word lists' increasing lexical and phonological complexity is consistent with the accepted developmental trajectory of phonological, linguistic, and reading development documented throughout later school years and adulthood (Bernthal et al., 2017).

Furthermore, it is linguistically justifiable to include regularly used loanwords in the adult corpus because they are common in spoken Kannada today and significantly influence the use of consonant clusters in adult communication (Sridhar, 1990).

The content relevance and representativeness of the chosen words are further supported by the high degree of expert agreement across all three-word lists. Because expert consensus processes use clinical experience and professional expertise to improve ecological validity and population suitability, they are widely accepted in the creation of speech and language evaluation tools (Lynn, 1986). Accordingly, the results of the familiarity validation phase show that the chosen stimuli meet recognized psychometric requirements for the creation of speech assessment materials (Divyashree & Sreedevi, 2018; Sangeetha, 2018).**5.2 Development of Consonant Cluster Passages in Kannada**

From the primary-level passage to the adult-level passage, the three evolved Kannada consonant cluster passages showed a steady increase in consonant cluster frequency as well as overall phonological and linguistic complexity. There were 36 consonant clusters in 115 words

in the primary-level reading, 80 clusters in 138 words in the secondary-level passage, and 108 clusters in 150 words in the adult-level text. Simpler two-element clusters appear earlier in development, while more complex multisyllabic cluster structures are gradually acquired with increasing linguistic experience and phonological maturation (Dyson, 1998; Stoel-Gammon, 1987). This graded progression reflects the known developmental trajectory of consonant cluster acquisition.

In addition to the increase in overall cluster frequency, the developed passages also demonstrated a progression in cluster complexity. Passage 1 contained only two-element consonant clusters, whereas Passages 2 and 3 additionally incorporated three-element clusters. The inclusion of more complex cluster structures further contributed to the graded increase in phonological complexity across the developed passages.

The graded complexity framework adopted in the present study is supported by hierarchical models of phonological complexity proposed in the speech-language pathology literature. Gierut (2005) emphasized that phonological complexity exists along a continuum and that assessment stimuli should reflect the natural progression of phonological acquisition. In the present study, consonant cluster density and structural complexity were systematically calibrated according to the educational level and linguistic exposure of the respective participant group. The higher proportion of consonant clusters incorporated into the secondary-level and adult-level passages was intended to reflect the increased occurrence of complex phonological structures in advanced academic, social, and professional communication contexts (Kent, 1997).

The graded increase in consonant cluster complexity across the three passages is also supported by the developmental findings of Divyashree and Sreedevi (2018). In their investigation of consonant cluster acquisition in Kannada, 49 non-geminate consonant clusters (19 initial and 30 medial clusters) were analyzed following the exclusion of three clusters

affected by colloquial variation. The study demonstrated that consonant cluster acquisition follows a gradual developmental trajectory, with medial clusters being acquired earlier than initial clusters and simpler two-element clusters being acquired before more complex three-element clusters. Furthermore, some complex clusters continued to develop beyond six years of age. These findings informed the systematic inclusion of consonant clusters of varying complexity across the three passages developed in the present study. Although all 49 non-geminate consonant clusters documented by Divyashree and Sreedevi (2018) were not incorporated into the passages, a broad range of cluster types was included while maintaining semantic meaningfulness, grammatical correctness, readability, and age appropriateness of the reading materials.

During passage construction, particular emphasis was placed on semantic meaningfulness, readability, thematic continuity, and grammatical naturalness. These factors are important for ensuring ecological validity in speech assessment because performance during connected reading tasks is influenced not only by articulatory demands, but also by lexical familiarity, syntactic complexity, and overall text coherence (Howell & Au-Yeung, 2002). Connected passages that are linguistically natural and contextually meaningful are more likely to elicit representative speech samples than isolated word lists or phonetically loaded pseudowords (Fairbanks, 1960; Kent, 1997). Therefore, the methodology adopted in the present study aligns with established principles of clinical passage development described in foundational speech assessment literature (Fairbanks, 1960; Powell, 2006).

The current passages' methodical use of consonant cluster patterns across initial, medial, and final word positions is one of its main advantages. Earlier Kannada reading materials, such as those developed by Rathna and Bettagiri (1972), Sangeetha (2018), and Savithri and Jayaram (2004, 2005), were not specifically designed to evaluate consonant cluster production but rather to measure reading fluency, phoneme representation, or speech rate. The

current passages, on the other hand, were created specifically to encourage the development of consonant clusters in connected discourse. Therefore, by offering linguistically organized resources for the assessment of consonant cluster-related speech features in both normally developing and clinical groups, they fill a significant gap in the literature on Kannada speech assessment. The systematic progression in cluster frequency and complexity across the three passages further supports their suitability for use across different educational and adult levels.

5.3 Content Validation of the Developed Passages

For factors ambiguity, clarity, cultural appropriateness and representativeness, each of the 3 developed paragraphs obtained a CVI of 1.0. Each statement was scored as appropriate or highly appropriate by each of the 11 expert panelists. A CVI of 1.0 provides strong agreement of experts for all factors evaluated and a CVI value of 1.0 is representative of maximum content validity. These findings provides strong evidence regarding language, cultural and clinical representativeness of the developed Kannada consonant cluster passages.

High clarity scores were awarded for all three passages indicating that they were linguistically clear and grammatically appropriate for the targeted school levels and the adult sample. Clarity is a very important aspect in speech and language assessment since an assessment passage that is complex or not structured logically will not only increase a child's cognitive load but might also impact their performance and speaking ability independently of actual speaking proficiency (Rae & Potter, 1973). The need to effectively manage phonological complexity, vocabulary familiarity and sentence structure is particularly important for the passage targeted at the primary level to avoid possible ceiling or floor effects when reading and to avoid the need for extensive preparation or re-reading to prepare the reading to enable smooth performance, thus avoiding impact on the speakers' performance independent of ability.

Likewise, the high ratings for representativeness indicates that the consonant cluster compositions of the passage were accurate for the actual spoken/written form of Kannada at the phonological level. This result is in agreement with Sridhar's (1990) characterization of the phonotactics of Kannada, in that consonant clusters are spaced throughout the word, with word-medial clusters being most common, and those in word-initial and word-final positions less common. From a clinical perspective, representativeness of materials is an important quality because of the likelihood of the overrepresentation of phonological processes that are infrequent and non-typical and that are not relevant to natural communication needs.

In the Kannada sociolinguistic setting, the consistently high evaluations for cultural appropriateness are also significant. The expert group unanimously concluded that the passages' terminology, concepts, and substance were suitable for Kannada-speaking people at all intended educational and adult levels. This result implies that the passages are more appropriate for usage in Kannada-speaking communities since they depict linguistically and culturally familiar circumstances. The unanimous endorsement of the passages by the experts further supports their applicability across diverse educational and sociocultural backgrounds within the Kannada-speaking community.

The validation procedure used in the present study strengthens the credibility and clinical usefulness of the developed passages. The inclusion of speech-language pathologists, Kannada school teachers, and a linguist in Kannada ensured that the passages were evaluated from multiple relevant perspectives. This multidisciplinary approach further supports the usefulness of the developed passages for assessing consonant cluster production in Kannada-speaking individuals. The incorporation of expert suggestions during passage refinement further strengthened the content validity and clinical applicability of the developed materials.

5.4 Validation of Applicability and Usability in the Typically Developing Population

Typically developing participants demonstrated near-ceiling reading accuracy and consonant cluster accuracy across all three passages. While participants in the and adult groups achieved 100% reading accuracy and 100% consonant cluster accuracy, a small number of reading and consonant cluster production errors were observed among primary-level participants. However, the overall accuracy scores were very good, suggesting that the developed passages were phonologically adequate, readable, and suitable for Kannada-speaking people at all participation levels. According to these results, the passages were successful in obtaining accurate speech in typically developing individuals, and they offer an effective baseline for comparison with clinical groups (Fairbanks, 1960; Sangeetha, 2018).

In accordance with normal oral reading assessment procedures, self-corrections and occasional hesitations during reading tasks were graded as correct when the final production was right (Clay, 2000). Rather than underlying phonological or articulatory issues, these behaviors most likely represent active self-monitoring throughout connected speech production. In typically developing people, self-correction during oral reading has been linked to phonological awareness, lexical availability, and speech motor monitoring (Howell & Au-Yeung, 2002). Even in competent speakers, cluster production may need more phonological planning due to the existence of such behaviors during consonant cluster production (Smith & Weber, 2017).

It's interesting to note that the majority of the words linked to self-corrections and hesitations had multiple cluster combinations, multisyllabic structures, or highly complicated consonant clusters. In the primary-level passage, hesitations were noted for English loanwords; in the secondary-level and adult passages, hesitations were noted for linguistically more complex words. All target words and consonant clusters were eventually produced correctly despite these brief interruptions, indicating that the observed behaviors were more likely to

reflect lexical retrieval and reading fluency requirements than deficiencies in consonant cluster production.

Reading time demonstrated variation across the three participant levels, with primary-level participants exhibiting the longest reading times, secondary-level participants demonstrating the shortest reading times, and adults showing intermediate values. The longer reading times observed among primary-level participants may reflect the developing nature of reading fluency, decoding skills, and phonological processing abilities in school-age readers, consistent with the developmental trajectory of reading acquisition reported in the literature (Share, 1995).

Similar findings were reported by Sangeetha (2018), who developed and standardized graded Kannada reading passages for children studying in Grades III to VII. The passages were designed to incorporate all phonemes of the Kannada language and were used to assess reading accuracy, fluency, and reading rate. The study reported improvements in reading performance with increasing grade level, indicating that reading fluency develops with greater linguistic maturity and reading experience. The present findings are consistent with these observations, as primary-level participants demonstrated longer reading times than secondary-level participants. Although Sangeetha (2018) focused on phonemically balanced passages, whereas the present study focused on consonant cluster passages, both studies highlight the influence of developmental and educational factors on reading fluency.

The relatively shorter reading times observed in secondary-level participants compared to adults may be related to the differing complexity levels of the passages administered to each group. Therefore, direct comparison of reading times between these groups should be interpreted cautiously, as different passages were administered to each participant level. Although the secondary-level passage contained more consonant clusters than the primary-level passage, it appeared to be well matched to the reading abilities and linguistic experience

of the participants. In contrast, the adult-level passage contained substantially higher consonant cluster density and greater structural complexity, which may have increased articulatory and phonological processing demands even in fluent adult readers. Increased cluster density has previously been associated with greater speech planning demands (Howell et al., 2000). Overall, these findings indicate that the developed passages were sensitive to differences in reading fluency and phonological processing across the targeted educational and adult levels.

5.5 Preliminary Clinical Validation in Individuals with Stuttering

Individuals with stuttering demonstrated generally high word-level and consonant cluster accuracy across all passages, although a small number of reading and consonant cluster errors were observed in Passage 1, however, they exhibited substantially increased dysfluencies during consonant cluster production compared to the typically developing group. Repetitions and blocks were the most commonly observed dysfluency types, accounting for 57.14% and 28.57% of all dysfluency occurrences, respectively. A combined pattern of repetitions and blocks was observed in a smaller proportion of participants. Reading time was also considerably longer in the stuttering group across all three passages, indicating reduced fluency during connected speech reading tasks.

The dissociation between accurate speech production and reduced fluency is clinically important because it suggests that the observed dysfluencies were related more to difficulties in speech planning and motor coordination than to phonological or articulatory inaccuracies. This finding is in line with Howell and Au-Yeung's (2002) EXPLAN model, which postulates that stuttering occurs when speech execution begins before phonological planning is finished. Consonant clusters may consequently put more strain on speech planning systems and raise the risk of dysfluency because of their enhanced phonological and articulatory complexity.

The predominance of repetitions observed in the present study is consistent with previous literature identifying repetitions as one of the most common stutter-like dysfluencies

during reading tasks involving phonologically complex material (Bloodstein & Bernstein Ratner, 2008). Similarly, the occurrence of blocks may reflect increased motor planning and articulatory initiation demands during consonant cluster production, which aligns with motor control theories of stuttering (Smith & Weber, 2017). The presence of combined repetitions and blocks in some participants further suggests that both phonological planning and speech motor initiation processes may contribute to fluency breakdown during complex cluster production.

Previous studies have also reported increased dysfluencies during consonant cluster production in individuals who stutter (Howell et al., 2000; Huinck et al., 2004; Masumi et al., 2015). In the Kannada context, Sangeetha and Reny (2020) similarly found that consonant cluster words elicited greater dysfluencies in Kannada-speaking adults who stutter. The present study extends these findings by demonstrating the applicability of consonant cluster-based passages across different participant groups, suggesting that consonant cluster complexity may influence fluency across varying levels of linguistic and reading proficiency in Kannada-speaking individuals who stutter.

Dysfluencies were observed across all three passages, supporting the clinical usefulness of the developed materials for eliciting and documenting fluency disruptions associated with consonant cluster production. These findings suggest that consonant cluster production during connected speech reading may contribute to fluency breakdowns in individuals with stuttering. Similar observations have been reported in previous studies examining the relationship between phonological complexity and stuttering (Howell et al., 2000; Huinck et al., 2004). Overall, the findings support the usefulness of the developed passages for identifying fluency disruptions associated with consonant cluster production in Kannada-speaking individuals who stutter.

5.6 Preliminary Clinical Validation in Individuals with Speech Sound Disorders

Individuals with speech sound disorders demonstrated reduced accuracy in consonant cluster production across all three developed passages compared to the typically developing group. Reading accuracy ranged from 74.00% (SD = 7.00) in the primary-level passage to 86.33% (SD = 2.52) in the secondary-level passage. Consonant cluster accuracy was comparatively lower, ranging from 55.33% (SD = 7.51) in the primary-level passage to 78.33% (SD = 10.50) in the adult-level passage. These findings suggest that consonant cluster production represents a significant area of difficulty for individuals with speech sound disorders. The results further support the usefulness of the developed passages in identifying consonant cluster production difficulties during connected speech.

Cluster reduction or simplification was the most frequently observed speech error pattern, accounting for 54.55% of all documented errors. Cluster reduction is one of the most prevalent phonological processes seen in both typical developing and individuals with speech sound disorders, according to developmental and clinical phonology literature (Stoel-Gammon, 1987; Dyson, 1998). Consonant clusters are more prone to error during speech production since they are typically seen as phonologically complicated entities (Gierut, 2005). The sensitivity of consonant cluster-based evaluation materials in identifying challenges related to complicated phonological structures is further supported by the prevalence of cluster reduction seen in the current study.

Kannada-based studies have similarly reported cluster reduction as a common error pattern in children during consonant cluster acquisition (Divyashree & Sreedevi, 2018; Jayashree, 1999). However, the persistence of this pattern in participants aged 8 years and above in the present study suggests delayed or disordered phonological development within the speech sound disorder group.

Substitution errors accounted for 27.27% of the observed error patterns and may reflect difficulties in accurate phoneme selection and phonological representation during connected speech production. Distortion and nasalization were each observed in 18.18% of participants. These findings indicate that, in addition to phonological difficulties, some participants also demonstrated articulatory or resonance-related characteristics. Nasalization may be associated with velopharyngeal dysfunction or related structural involvement (Peterson-Falzone et al., 2010).

Consonant cluster accuracy was lower among primary-level participants with speech sound disorders compared to participants at the secondary-level and adult level within the same clinical group. This finding may reflect differences in linguistic experience, phonological development, and exposure to consonant cluster structures across educational levels. The comparatively higher accuracy observed in older participants may be associated with increased linguistic experience and, in some cases, prior intervention. However, the persistence of reduced consonant cluster accuracy even among adults suggests that consonant cluster production may remain vulnerable in individuals with speech sound disorders. These findings support the sensitivity of the developed passages in identifying difficulties associated with consonant cluster production across different participant levels.

The developed passages' value as evaluation tools for speech sound disorder was supported by their ability to induce clinically significant error patterns in related speech environments. Connected passage reading, in contrast to isolated word-level tasks, enables assessment of consonant the development of clusters in more natural speaking settings involving coarticulation, prosody, and continuous speech demands (Kent, 1997). Overall, these findings support the clinical applicability of the developed passages for assessing consonant cluster production in Kannada-speaking individuals with speech sound disorders. The ability of the passages to elicit cluster reduction, substitution, distortion, and nasalization further

demonstrates their usefulness for identifying clinically relevant speech error patterns during connected speech assessment.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Passages occupy an important role in the clinical assessment of speech and language abilities because they provide contextually rich and naturalistic samples of speech production. Unlike isolated word-level tasks, connected reading passages allow simultaneous evaluation of multiple speech parameters such as articulatory accuracy, fluency, prosody, and reading rate within a single task. In phonological and fluency assessment, passages containing consonant clusters are particularly useful because they help elicit cluster-related speech behaviours in connected speech.

Although Kannada reading passages are available for general speech and reading assessment, no standardized materials specifically targeting consonant cluster production were available. Therefore, the present study was undertaken to develop and validate consonant cluster passages in Kannada for primary-level children, secondary-level children, and adults and to examine their applicability in typically developing individuals and clinical usefulness in individuals with stuttering and speech sound disorders.

6.1 Overview of the Study

The study employed a cross-sectional descriptive research design and was carried out in three phases:

1. Development of consonant cluster passages in Kannada
2. Content validation of the developed passages
3. Validation of applicability and preliminary clinical validation

There were 51 participants in all, divided into three participation levels: adults (18 years and over), secondary-level children (13–17 years), and primary-level children (8–12 years). Typically developing individuals (n = 30), individual with stuttering (n = 12), and individuals

with speech sound disorders (n = 9) made up the sample. There were no known neurological or hearing abnormalities impacting speech, and all individuals were native or predominantly Kannada native speakers with excellent reading abilities.

6.2 Phase I: Development of Consonant Cluster Passages in Kannada

Phase I comprised corpus compilation, familiarity validation of consonant cluster words, and passage development.

Kannada textbooks, children's storybooks, publications, newspapers, literary resources, and previously accessible corpora were used to gather a set of consonant cluster words suitable for the three participant levels. Because they frequently contain consonant cluster combinations that are important for phonological assessment, loanwords that are frequently used in Kannada were also included. To ensure readability and developmental appropriateness, uncommon or unfamiliar words were eliminated.

Six specialists, including linguists, Kannada teachers, and speech-language pathologists, assessed the word lists. Words with a minimum agreement of 75% were kept after experts evaluated the age appropriateness and words' familiarity. The appropriateness of the chosen stimuli was validated by high levels of agreement. Three Kannada consonant cluster passages were developed for primary-level children, secondary-level children, and adults based on the compiled word lists. Semantic coherence, grammatical accuracy, readability, and gradual phonological complexity were all maintained in the passage. In the primary-level passage, there were 115 words and 36 consonant clusters 138 words and 80 clusters in the secondary-level passage, and 150 words and 108 clusters in the adult passage.

6.3 Phase II: Content Validation of the Developed Passages

After the development of passages, 11 experts, including Kannada linguists, Kannada teachers, and speech-language pathologists, used a four-point Likert scale to assess the passages for ambiguity, clarity, cultural appropriateness, and representativeness.

Excellent content validity was demonstrated by the three passages' Content Validity Index (CVI) of 1.0 across all assessed criteria. The final versions of the passages included a few minor recommendations from the experts. The produced passages were then given to clinical populations and usually developing individuals in order to determine their applicability and clinical utility.

6.4 Phase III: Validation of Applicability and Preliminary Clinical Validation

6.4.1 Typically Developing Population

The finalized passages were distributed to 30 Kannada-speaking participants of various ages. The materials' developmental appropriateness and readability were confirmed by the participants' high levels of reading accuracy overall

developmental appropriateness and readability of the developed passages. While reading, there were occasional hesitations and self-corrections, but these were not recorded as errors because individuals gradually produced correct final responses. Primary-level individuals had the longest reading times, whereas secondary-level participants showed the shortest reading times. The reading times of adults were in between those of the two groups.

it also depends on the number of words in the passage and the reading ability of the individuals.

6.4.2 Individuals with Stuttering

Twelve stutterers were given the passages. participants showed more dysfluencies even if they produced consonant clusters accurately. The most frequent type of dysfluency was repetitions, which were followed by blocks and repetitions mixed with blocks. Compared to the typically developing group, the stuttering group spent significantly more time reading. All

three passages showed dysfluencies, suggesting that the production of consonant clusters during connected speech reading may put more strain on stutterers' fluency systems. The EXPLAN hypothesis and motor control theories, which contend that higher phonological preparation and articulatory demands lead to fluency breakdowns during speech production, are supported by these data.

6.4.3 Individuals with Speech Sound Disorders

The passages were also administered to nine individuals with speech sound disorders. Compared to the typically developing group, these participants demonstrated reduced reading accuracy and consonant cluster accuracy. Cluster reduction or simplification was the most frequently observed speech error pattern, followed by substitution, distortion, and nasalization. These findings are consistent with developmental and clinical phonology literature identifying consonant clusters as a major area of difficulty in individuals with speech sound disorders. Consonant cluster accuracy improved gradually from childhood to adulthood within the clinical group; however, reduced cluster accuracy persisted even in adults, suggesting that consonant cluster production remains a vulnerable area across the lifespan in this population.

6.5 Conclusions

The following conclusions were drawn from the present study:

1. The consonant cluster words in Kannada demonstrated high familiarity and appropriateness for the intended educational levels and adult population based on expert validation.

2. Three consonant cluster passages in Kannada were successfully developed for primary-level children, secondary-level children, and adults with progressively increasing phonological complexity.

3. All three passages demonstrated excellent content validity, confirming their suitability for Kannada-speaking populations.

4. Typically developing participants demonstrated excellent reading and consonant cluster accuracy, confirming the developmental appropriateness and readability of the passages.

5. Individuals with stuttering demonstrated increased dysfluencies during consonant cluster production despite maintaining phonological accuracy, indicating the sensitivity of the passages to fluency disruptions.

6. Individuals with speech sound disorders demonstrated reduced consonant cluster accuracy and multiple clinically significant speech error patterns, particularly cluster reduction.

7. The developed consonant cluster passages in Kannada provide a standardized and clinically useful tool for assessing consonant cluster production, fluency, and speech error patterns in Kannada-speaking individuals across different participant levels.

6.6 Implications of the study

The current study resulted in the development of the consonant cluster passages in Kannada for primary, secondary, and adult d. As per our knowledge this is the first study conducted with respect to Indian context. The developed passages systematically combine consonant cluster structures within related speech contexts, providing speech-language pathologists a linguistically suitable and developmentally graded assessment resource for evaluating consonant cluster production.

Over the length of the three passages, both the number and complexity of consonant clusters grew gradually, reflecting the methodical hierarchy used during passage developing and maintaining an ongoing increase in phonological complexity across participant levels.

Both in individuals who stutter and speech sound disorders the passage showed initial clinical usefulness. The passages successfully induced dysfluencies in stutterers during

connected speech reading, with repetitions and blocks showing up as the most common types of dysfluencies. These results imply that the passages could be helpful in documenting and recording fluency interruptions related to the production of consonant clusters.

The passages were successful in eliciting clinically significant speech error patterns in people with speech sound disorders, such as cluster reduction, substitution, distortion, and nasalization. According to the results, the passages could be helpful in assessing consonant cluster difficulties with production and associated error patterns in related speech contexts.

Beyond stuttering and speech sound disorders, the developed passages may have potential clinical applications in a wider range of communication disorders. The passages may be useful for obtaining connected speech samples from school-age children and adults, thereby facilitating the observation of reading accuracy, speech intelligibility, and articulatory performance. They may also provide clinically relevant speech samples for the perceptual evaluation of voice quality in individuals with voice disorders and for examining articulatory coordination and intelligibility in motor speech disorders such as dysarthria and apraxia of speech. In addition, speech rate measures derived from the passages may offer useful information in conditions such as cluttering and neurogenic fluency disorders, thereby extending the potential clinical utility of the developed materials.

Furthermore, the graded structure of the passages allows flexible application across different educational and adult levels. The passages may therefore serve as a valuable clinical resource for baseline assessment, differential diagnosis, intervention planning, and treatment outcome monitoring. All things considered, the current work advances the development of linguistically and culturally suitable Kannada evaluation tools that methodically include consonant clusters for use in speech-language pathology.

6.7 Limitations

The overall sample size was relatively small, comprising 30 typically developing participants and 21 individuals with speech disorders. As a result, the findings should be interpreted with caution, as the limited sample size may restrict the generalizability of the results to the broader Kannada-speaking population. Furthermore, the sample size was insufficient to permit inferential statistical analyses, and therefore the findings primarily provide preliminary evidence regarding the applicability, usability, and clinical utility of the developed consonant cluster passages.

Clinical validation of the developed passages was carried out only in individuals with stuttering and speech sound disorders. The applicability of the passages in other communication disorders such as apraxia of speech, dysarthria, cleft lip and palate, hearing impairment, and neurogenic communication disorders was not examined in the present study. Therefore, the clinical usefulness of the developed passages across a wider range of communication disorders remains to be established.

Although the present study incorporated a broad range of consonant cluster structures, not all 49 non-geminate consonant clusters reported for Kannada could be included. This was primarily because passage development required that the selected words and sentences be lexically familiar, semantically meaningful, grammatically correct, readable, and age appropriate across the three participant levels. As a result, only those consonant clusters that could be naturally embedded into meaningful and level-appropriate passages were included in the final materials.

The frequency of occurrence of individual consonant clusters was not uniform across the three passages. Some clusters appeared multiple times, while others were represented only once or twice, largely due to limited lexical availability and the need to maintain passage coherence and linguistic appropriateness. Therefore, cluster-specific performance findings

should be interpreted carefully, keeping in mind that the number of production opportunities varied across different cluster types.

6.8 Directions for Future Research

Future research should focus on establishing normative data for the developed consonant cluster passages in Kannada using larger and more representative samples across primary-level children, secondary-level children, and adults. Including participants from different regional and dialectal backgrounds within Karnataka would improve the generalizability of the findings and the clinical applicability of the developed materials.

Further research may examine the usefulness of the developed passages in other clinical populations such as individuals with dysarthria, apraxia of speech, cleft lip and palate, hearing impairment, neurogenic communication disorders, and voice disorders. This would help determine the broader diagnostic utility of the passages across a wider range of communication disorders.

Future studies may also explore the development of consonant cluster passages with a more comprehensive representation of Kannada consonant clusters, including cluster types that could not be incorporated in the present study. Such efforts should continue to ensure that lexical familiarity, semantic meaningfulness, grammatical correctness, and age appropriateness are maintained across participant levels.

Future studies may also extend the methodology used in the present study to develop consonant cluster passages in other Indian languages such as Tamil, Telugu, Malayalam, and Hindi. This would contribute to the development of culturally and linguistically appropriate speech assessment materials for diverse Indian language populations and strengthen the field of speech-language pathology across the Indian subcontinent.

REFERENCES

Banik, S. (1988). *Consonant cluster acquisition in Bengali-speaking children*. All India Institute of Speech and Hearing.

Barathy, S. (2001). *Acquisition of consonant clusters in Tamil-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Bernstein Ratner, N. (2005). Evidence-based practice in stuttering: Some questions to consider. *Journal of Fluency Disorders, 30*(3), 163–188. https://doi.org/10.1016/j.jfludis.2005.05.003

Bernthal, J. E., Bankson, N. W., & Flipsen, P. (2017). *Articulation and phonological disorders: Speech sound disorders in children* (8th ed.). Pearson.

Bloodstein, O., & Bernstein Ratner, N. (2008). *A handbook on stuttering* (6th ed.). Delmar Cengage Learning.

Browman, C. P., & Goldstein, L. (1990). Tiers in articulatory phonology, with some implications for casual speech. In J. Kingston & M. E. Beckman (Eds.), *Papers in laboratory phonology I: Between the grammar and physics of speech* (pp. 341–376). Cambridge University Press.

Byrd, C. T., Vallely, M., Anderson, J. D., & Sussman, H. (2017). Phonetic complexity and stuttering in Spanish. *Journal of Communication Disorders, 45*(1), 67–77. https://doi.org/10.1016/j.jcomdis.2011.12.002

Chervela, N. (1981). Medial consonant cluster acquisition by Telugu-speaking children. *Journal of Child Language, 8*(1), 63–73. https://doi.org/10.1017/S0305000900003032

Clay, M. M. (2000). *Running records for classroom teachers*. Heinemann.

Crystal, D., & House, A. S. (1982). Comparative studies of phonological awareness in children. *Applied Psycholinguistics, 3*(4), 287–311.

Darley, F. L., Aronson, A. E., & Brown, J. R. (1975). *Motor speech disorders*. W. B. Saunders.

Deepa, K., & Savitri, S. (2010). *Acquisition of consonant clusters in Kannada-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Divya, R., & Sreedevi, N. (2010). *Acquisition of consonant clusters in Malayalam-speaking children aged 2.0–3.0 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Divyashree, H. S., & Sreedevi, N. (2018). Acquisition of non-geminate consonant clusters in Kannada. *Journal of Indian Speech Language & Hearing Association, 32*(1), 1–10.

Dyson, A. T. (1998). Phonological development. In W. O. Haynes & B. B. Shulman (Eds.), *Communication development: Foundations, processes, and clinical applications* (pp. 115–145). Williams & Wilkins.

Fairbanks, G. (1940). *Voice and articulation drillbook*. Harper & Brothers.

Fairbanks, G. (1960). *Voice and articulation drillbook* (2nd ed.). Harper & Row.

Gayathri, N. (1980). *Development of reading passages to investigate phonatory behaviour in individuals who stutter*. All India Institute of Speech and Hearing.

Gierut, J. A. (2005). Phonological intervention: The how or the what? In A. G. Kamhi & K. E. Pollock (Eds.), *Phonological disorders in children* (pp. 201–210). Paul H. Brookes.

Grunwell, P. (1985). *Phonological assessment of child speech (PACS)*. NFER-Nelson.

Grunwell, P. (1987). *Clinical phonology* (2nd ed.). Croom Helm.

Hiremath, R. C. (1961). *The structure of Kannada*. Karnatak University.

Honorof, D., Cullough, J. M., & Somerville, B. (2000). *Comma gets a cure*. Unpublished manuscript, Yale University.

Howell, P., & Au-Yeung, J. (2002). The EXPLAN theory of fluency control applied to the diagnosis of stuttering. In E. Fava (Ed.), *Pathology and therapy of speech disorders* (pp. 75–94). John Benjamins.

Howell, P., & Au-Yeung, J. (2007). Phonetic complexity and stuttering in Spanish. *Journal of Fluency Disorders, 32*(2), 82–97.

Howell, P., Au-Yeung, J., & Sackin, S. (2000). Internal structure of content words leading to lifespan differences in phonological difficulty in stuttering. *Journal of Fluency Disorders, 25*(1), 1–20. https://doi.org/10.1016/S0094-730X(99)00023-3

Howell, P., Davis, S., & Williams, R. (2009). The effects of phonetic complexity on stuttering in school-age children who stutter. *Journal of Developmental and Physical Disabilities, 21*(1), 31–44.

Huinck, W. J., van Lieshout, P. H., Peters, H. F., & Hulstijn, W. (2004). Gestural overlap in consonant clusters: Effects on the fluent speech of stuttering and non-stuttering subjects. *Journal of Fluency Disorders, 29*(1), 3–25. https://doi.org/10.1016/j.jfludis.2003.09.001

International Phonetic Association. (1949). *The principles of the International Phonetic Association*. University College London.

Jayashree, R. (1999). *Phonological processes in Kannada-speaking children with typical development* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Kent, R. D. (1997). *The speech sciences*. Singular Publishing Group.

LaSalle, L. R., & Wolk, L. (2011). Stuttering, cluttering, and phonological complexity: Case studies. *Journal of Fluency Disorders, 36*(4), 285–289. https://doi.org/10.1016/j.jfludis.2011.04.001

Levelt, W. J. M. (1989). *Speaking: From intention to articulation*. MIT Press.

Loomba, M. (1995). *Development of reading passages for assessment of reading comprehension in Hindi-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382–385.

Masumi, O., Howell, P., & Nakai, S. (2015). Phonetic complexity and stuttering in Japanese. *Clinical Linguistics & Phonetics, 29*(1), 60–75.

Maya, T. (1990). *Acquisition of consonant clusters in Malayalam* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

McAfee, J. G., & Shipley, K. G. (2004). *Assessment in speech-language pathology: A resource manual* (3rd ed.). Delmar Learning.

McLeod, S., van Doorn, J., & Reed, V. A. (2001). Normal acquisition of consonant clusters. *American Journal of Speech-Language Pathology, 10*(2), 99–110. https://doi.org/10.1044/1058-0360(2001/011)

Morrish, E., Leahy, M., & Dodd, B. (2017). Stuttering in multilingual speakers: Evidence from Afrikaans, English, and German. *Journal of Fluency Disorders, 51*, 1–12.

Neenu, K., & Sreedevi, N. (2011). *Acquisition of medial consonant clusters in Malayalam-speaking children aged 3–6 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Neethipriya, K., & Manjula, R. (2007). *Acquisition of consonant clusters in Telugu-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Padmaja, G. (1988). *Development of the Telugu Test of Articulation and Discrimination* [Unpublished doctoral dissertation]. All India Institute of Speech and Hearing.

Peterson-Falzone, S. J., Trost-Cardamone, J. E., Karnell, M. P., & Hardin-Jones, M. A. (2010). *The clinician's guide to treating cleft palate speech*. Mosby Elsevier.

Powell, T. W. (2006). An integrated evaluation of nonsense word reading to assess phonological decoding abilities. *Seminars in Speech and Language, 27*(2), 76–85.

Prema, K. S. (1997). *Development of reading passages in Kannada for assessment of speech and language* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Prathima, S., & Sreedevi, N. (2009). *Acquisition of consonant clusters in Kannada-speaking children aged 3–4 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Priyadarshi, R., Geetha, C., & Ramaa, S. (2012). Development and standardization of reading passages for school-aged children. *Journal of Indian Speech Language & Hearing Association, 26*(1), 1–9.

Rae, G., & Potter, T. C. (1973). *Informal reading diagnosis: A practical guide for the classroom teacher*. Prentice Hall.

Ramaa, S. (1985). *Development of reading passages for Kannada-speaking school children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Rathna, N., & Bettagiri, R. (1972). *Development of articulation test passages in Kannada* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Robb, M. P., & Blomgren, M. (1996). Analysis of F2 transitions in the speech of stutterers and non-stutterers. *Journal of Fluency Disorders, 22*(1), 1–16.

Rupela, V., & Manjula, R. (2006). Phonotactic patterns in the speech of Kannada-speaking children. *Journal of Indian Speech Language & Hearing Association, 20*(1), 10–19.

Sangeetha, M. (2018). *Development and standardization of graded reading passages for Kannada-speaking school children in Grades III–VII*. All India Institute of Speech and Hearing.

Sangeetha, M., & Geetha, C. (2015). Effect of phonological complexity on disfluencies in Kannada-speaking adults who stutter. *Journal of Indian Speech Language & Hearing Association, 29*(2), 45–53.

Sangeetha, M., & Reny, J. (2020). Effect of syllable complexity on speech disfluencies in Kannada-speaking adults with stuttering. *Journal of Indian Speech Language & Hearing Association, 34*(1), 12–20.

Santhosh, M. (2001). *Acquisition of consonant clusters in Hindi-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Savithri, S. R., & Jayaram, M. (2004). Development of reading passages for assessment of speech rate in Dravidian languages. *Journal of Indian Speech Language & Hearing Association, 18*(1), 1–8.

Savithri, S. R., & Jayaram, M. (2005). Normative data on speech rates in four Dravidian languages. *Journal of Indian Speech Language & Hearing Association, 19*(2), 9–17.

Shashidhar, H. (1984). *Analysis of stuttering in Kannada-speaking adults using combined and voiced passages* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Share, D. L. (1995). Phonological recoding and self-teaching: Sine qua non of reading acquisition. *Cognition, 55*(2), 151–218. https://doi.org/10.1016/0010-0277(94)00645-2

Shriberg, L. D., & Kwiatkowski, J. (1980). *Natural process analysis (NPA): A procedure for phonological analysis of continuous speech samples*. Macmillan.

Smith, A., & Weber, C. (2017). How stuttering develops: The multifactorial dynamic pathways theory. *Journal of Speech, Language, and Hearing Research, 60*(9), 2483–2505. https://doi.org/10.1044/2017_JSLHR-S-16-0343

Sneha, P., & Sreedevi, N. (2012). *Acquisition of non-geminate consonant clusters in Telugu-speaking children aged 4–6 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Sridhar, S. N. (1990). *Kannada*. Routledge.

Stoel-Gammon, C. (1987). Phonological skills of 2-year-olds. *Language, Speech, and Hearing Services in Schools, 18*(4), 323–329. https://doi.org/10.1044/0161-1461.1804.323

Storkel, H. L. (2004). The emerging lexicon of children with phonological delays: Phonotactic constraints and probability in acquisition. *Journal of Speech, Language, and Hearing Research, 47*(5), 1194–1212.

Throneburg, R. N., Yairi, E., & Paden, E. P. (1994). Relation between phonologic difficulty and the occurrence of disfluencies in the early stage of stuttering. *Journal of Speech and Hearing Research, 37*(3), 504–509.

Usha, R., & Sreedevi, N. (2010). *Consonant cluster acquisition in Telugu-speaking children* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Vipina, V., & Sreedevi, N. (2011). *Acquisition of initial and medial consonant clusters in Malayalam-speaking children aged 3–6 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Vitevitch, M. S., & Luce, P. A. (1999). Probabilistic phonotactics and neighborhood activation in spoken word recognition. *Journal of Memory and Language, 40*(3), 374–408. https://doi.org/10.1006/jmla.1998.2618

Vrinda, K., & Sreedevi, N. (2011). *Acquisition of consonant clusters in Malayalam-speaking children aged 4–6 years* [Unpublished master's dissertation]. All India Institute of Speech and Hearing.

Wiederholt, J. L., & Bryant, B. R. (1992). *Gray oral reading tests* (3rd ed.). Pro-Ed.

Wilson, D. K. (1987). *Voice problems of children* (3rd ed.). Williams & Wilkins.

Wilson, F. B., & Rice, M. (1977). *A programmed approach to voice therapy*. Learning Concepts.

APPENDIX A

ALL INDIA INSTITUTE OF SPEECH AND HEARING

Developed by: Ms. Vidya HS **Guide: Dr. Sangeetha Mahesh**

PASSAGE DEVELOPED FOR PRIMARY LEVEL: 8-12 YEARS

ಪ್ರತಿ ದಿನ ಬೆಳಿಗ್ಗೆ ಬೇಗ ಏಳುತ್ತೇನೆ, ಎದ್ದು ದೇವರಿಗೆ ನಮಸ್ಕಾರ ಮಾಡುತ್ತೇನೆ.
ಇಂದು ಬ್ರಷ್ ಮಾಡಿ ಸ್ನಾನ ಮಾಡಿದೆನು. ಆಮೇಲೆ ಶರ್ಟ್ ಪ್ಯಾಂಟ್ ಹಾಕಿಕೊಂಡೆನು.
ಅಮ್ಮ ಚಪಾತಿ ಮತ್ತು ಪಲ್ಯ ಮಾಡಿದ್ದರು. ಅದನ್ನು ಸ್ವಲ್ಪ ತಿಂದು ನಾನು ಶಾಲೆಗೆ ತಯಾರಾದೆನು.
ಆಮೇಲೆ ಅಮ್ಮ ಬ್ಯಾಗಿಗೆ ಪುಸ್ತಕಗಳನ್ನು ಹಾಕಿದರು.

ನಂತರ ನಾನು ನನ್ನ ಸ್ನೇಹಿತನ ಜೊತೆ ಸ್ಕೂಲಿಗೇ ಹೋದೆನು.
ಕ್ಲಾಸ್‌ನಲ್ಲಿ ನಿನ್ನೆ ನಡೆದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳನ್ನು ಕೊಟ್ಟರು. ನನಗೆ ಜಾಸ್ತಿ ಅಂಕಗಳು ಬಂದಿದ್ದವು.
ಆಮೇಲೆ ಮಾಸ್ಟರ್ ಪಾಠ ಶುರು ಮಾಡಿದರು. ಅವರು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಿದಾಗ ನಾನು ಉತ್ತರ ಹೇಳಿದೆನು.
ಬ್ರೇಕ್ ಸಮಯದಲ್ಲಿ ಕ್ರಿಕೆಟ್ ಆಡಿದೆವು.
ಶಾಲೆ ಮುಗಿದ ನಂತರ ಮನೆಗೆ ಬಂದೆನು.

ಆಮೇಲೆ ಅಪ್ಪನ ಜೊತೆ ಸ್ಕೂಟರ್‌ನಲ್ಲಿ ತೋಟಕ್ಕೆ ಹೋದೆನು.
ಅಲ್ಲಿ ಪ್ರಾಣಿ ಮತ್ತು ಪಕ್ಷಿಗಳು ಹಣ್ಣು ತಿನ್ನಲು ಬಂದಿದ್ದವು.
ಅಲ್ಲಿನ ಪ್ರಕೃತಿ ಸೌಂದರ್ಯವನ್ನು ನಾವು ಆನಂದಿಸಿದೆವು.
ನಾನು ಕುರ್ಚಿಯಲ್ಲಿ ಕೂತು ದ್ರಾಕ್ಷಿ ತಿಂದೆನು.
ನಂತರ ನಾನು ಮತ್ತು ಅಪ್ಪ ಸೂರ್ಯ ಚಂದ್ರರ ಚಿತ್ರ ಬಿಡಿಸಿದೆವು.
ನಂತರ ದೇವಸ್ಥಾನಕ್ಕೆ ಹೋಗಿ ಪ್ರಾರ್ಥನೆ ಮಾಡಿದೆವು.
ರಾತ್ರಿ ಆಗುವ ಮೊದಲು ಮನೆಗೆ ಬಂದೆವು. ನಂತರ ನಿದ್ರೆ ಮಾಡಿದೆವು.

APPENDIX B

ALL INDIA INSTITUTE OF SPEECH AND HEARING

Developed by: Ms. Vidya HS **Guide: Dr. Sangeetha Mahesh**

PASSAGE DEVELOPED FOR SECONDARY LEVEL: 13-17 YEARS

ನಮ್ಮ ಸ್ಕೂಲ್‌ನಲ್ಲಿ ಸ್ವಾತಂತ್ರ್ಯ ದಿನಾಚರಣೆಯಂದು ಸುಂದರ ಕಾರ್ಯಕ್ರಮ ನಡೆಯಿತು. ಮಕ್ಕಳೆಲ್ಲ ಸಮವಸ್ತ್ರ ಧರಿಸಿ ಕಂಗೊಳಿಸುತ್ತಿದ್ದರು. ಬೆಳಿಗ್ಗೆ ಎಲ್ಲರು ದ್ವಾರದ ಬಳಿ ಶಿಕ್ಷಕರನ್ನು ಸ್ವಾಗತಿಸಿದರು. ಮಕ್ಕಳು ಬ್ಲಾಕ್‌ಬೋರ್ಡ್ ಮೇಲೆ ಚಿತ್ರ ಬರೆದು ಕಾರ್ಯಕ್ರಮದ ಪ್ಲಾನ್ ಮಾಡಿದ್ದರು. ನಂತರ ಎಲ್ಲರೂ ಇಡ್ಲಿ ಚಟ್ನಿ ತಿಂದು ಕಾರ್ಯಕ್ರಮವನ್ನು ಪ್ರಾರಂಭಿಸಿದರು. ಕಾರ್ಯಕ್ರಮದ ಆರಂಭದಲ್ಲಿ ಮಕ್ಕಳು ಡ್ರಮ್ ಧ್ವನಿಯೊಂದಿಗೆ ರಾಷ್ಟ್ರಗೀತೆ ಹಾಡಿ ಧ್ವಜಕ್ಕೆ ಗೌರವ ಸಲ್ಲಿಸಿದರು. ಸಂಸ್ಥೆಯ ಮುಖ್ಯೋಪಾಧ್ಯಾಯರು ರಾಜ್ಯ ಮತ್ತು ವಿಶ್ವದ ಬಗ್ಗೆ, ಹಾಗೆಯೇ ನಮ್ಮ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಸರಳವಾಗಿ ವಿವರಿಸಿದರು. ಅವರು ದೇಶದ ಅಭಿವೃದ್ಧಿಗಾಗಿ ಸರ್ಕಾರದ ಪಾತ್ರ ಮತ್ತು ನಮ್ಮ ಕರ್ತವ್ಯಗಳ ಬಗ್ಗೆ ತಿಳಿಸಿದರು. ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳು ಗ್ರಂಥಾಲಯದಲ್ಲಿ ಓದಿದ ಮಹಾತ್ಮಾ ಗಾಂಧಿ ಅವರ ಪುಸ್ತಕದ ಬಗ್ಗೆ ಚರ್ಚೆ ಮಾಡಿದರು. ವಿಷ್ಣು, ಲಕ್ಷ್ಮಿ ಮತ್ತು ಇತರ ಸ್ನೇಹಿತರು ಸ್ಪರ್ಧೆಯಲ್ಲಿ ಭಾಗವಹಿಸಿದರು. ಇನ್ನೂ ಕೆಲವರು ವಿಜ್ಞಾನದ ವಿಷಯಗಳ ಬಗ್ಗೆ ಮಾತನಾಡಿ ಪ್ರಶಂಸೆ ಪಡೆದರು. ಶಿಕ್ಷಕರು ಮಕ್ಕಳಿಗೆ ಶ್ರದ್ಧೆ, ಶಕ್ತಿ ಹಾಗೂ ಧೈರ್ಯದ ಮಹತ್ವವನ್ನು ತಿಳಿಸಿದರು. ಮಕ್ಕಳು ನೃತ್ಯ, ಗಾನ ಮತ್ತು ನಾಟಕದಲ್ಲಿ ಪಾಲ್ಗೊಂಡು ಸಂಭ್ರಮಿಸಿದರು. ಮಕ್ಕಳಿಗೋಸ್ಕರ ವಿಶೇಷವಾಗಿ ಕ್ಲಾಸ್‌ನಲ್ಲಿ ಶಿಕ್ಷಕಿ ಸುದರ್ಶನ ಚಕ್ರ, ಅಮ್ಮನಿಗೆ ಒಂದು ಪತ್ರ, ಅರ್ಜುನನ ಕಲ್ಪನೆ ಮತ್ತುವಿಭಿನ್ನ ಪ್ರಾಣಿಗಳ ಶಬ್ದಗಳ ಕುರಿತು ಕಥೆ ಹೇಳಿದರು. ಕೊನೆಯಲ್ಲಿ ಕ್ಲಾಸ್‌ನಲ್ಲಿ ಜಾಸ್ತಿ ಮಾರ್ಕ್ಸ್ ಪಡೆದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪ್ರಶಸ್ತಿಯಾಗಿ ಬುಕ್ಸ್ ವಿತರಿಸಲಾಯಿತು. ಮಕ್ಕಳು ಪರಸ್ಪರ ಸಹಾಯ ಮಾಡಿಕೊಂಡು ಕಾರ್ಯಕ್ರಮವನ್ನು ಯಶಸ್ವಿಯಾಗಿ ಪೂರ್ಣಗೊಳಿಸಿದರು.

APPENDIX C

ALL INDIA INSTITUTE OF SPEECH AND HEARING

Developed by: Ms. Vidya HS **Guide: Dr. Sangeetha Mahesh**

PASSAGE DEVELOPED FOR ADULT: 18+ YEARS

ಭಾರತದ ಪ್ರಖ್ಯಾತ ವಿಜ್ಞಾನಿ ಡಾಕ್ಟರ್ ಎ ಪಿ ಜೆ ಅಬ್ದುಲ್ ಕಲಾಂ ಅವರು ಜ್ಞಾನ, ಜ್ಞಾಪಕಶಕ್ತಿ, ಪ್ರಜ್ಞೆ ಮತ್ತು ಸ್ವಯಂಪ್ರೇರಿತ ಪ್ರಯತ್ನಗಳಿಂದ ಪ್ರಸಿದ್ಧರಾಗಿದ್ದರು. ಹಲವು ವಿಘ್ನಗಳು, ದ್ವಂದ್ವಾತ್ಮಕ ಪರಿಸ್ಥಿತಿಗಳು, ಮತ್ತು ತಿರಸ್ಕಾರಗಳ ನಡುವೆಯೂ ವಜ್ರದಂತೆ ದೃಢಸಂಕಲ್ಪ ಮತ್ತು ಸ್ಥೈರ್ಯದಿಂದ ಮುಂದುವರಿದು ಗುರಿಯನ್ನು ಸಾಧಿಸಿದರು.
ಕ್ಷಿಪ್ರ ಕ್ರಿಯಾಶೀಲತೆ, ಸೂಕ್ಷ್ಮ ವೀಕ್ಷಣೆ, ಮತ್ತು ಸರಿಯಾದ ಕ್ರಮವನ್ನು ಅನುಸರಿಸಿ ಮಹತ್ವದ ಆವಿಷ್ಕಾರಗಳನ್ನು ಸಾಧಿಸಿದರು. ತಮ್ಮ ಅನುಭವ, ಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ, ಕಾರ್ಯಕ್ಷಮತೆಯನ್ನು ಹಂಚಿಕೊಳ್ಳಲು ಅವರು ಲಯನ್ಸ್ ಕ್ಲಬ್ ಹಾಗೂ ಒಂದು ಶಿಕ್ಷಣ ಟ್ರಸ್ಟ್ ಸಂಸ್ಥೆಯ ಸಭೆಯಲ್ಲಿ ಭಾಗವಹಿಸಿದರು. ಅವರು ಬ್ಲ್ಯಾಕ್‌ಬೋರ್ಡ್ ಬಳಸಿ ತಮ್ಮ ಆಲೋಚನೆಗಳನ್ನು ವಿವರಿಸಿದರು. ನಂತರ ಕೆಲವರು ತಮ್ಮ ಪರಿಕಲ್ಪನೆಗಳನ್ನು ವ್ಯಕ್ತಪಡಿಸಿ ಚರ್ಚೆಯನ್ನು ಮುಂದುವರಿಸಿದರು.
ಇದೇ ಸಂದರ್ಭದಲ್ಲಿ, ಶ್ರೀಕೃಷ್ಣನ ಜೀವನದ ಉದಾಹರಣೆಯನ್ನು ನೀಡಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕರ್ತವ್ಯನಿಷ್ಠೆ, ಶ್ರದ್ಧೆ, ಮತ್ತು ಪ್ರೇರಣೆಯ ಮಹತ್ವವನ್ನು ತಿಳಿಸಲಾಯಿತು. ಅಟ್ಲಸ್ ನಕ್ಷೆಯ ಮೂಲಕ ವಿವಿಧ ಪ್ರದೇಶಗಳ ಪರಿಚಯ ನೀಡಿ, ಉದ್ಯೋಗ ಕ್ಷೇತ್ರದಲ್ಲಿ ಸರಿಯಾದ ಮಾರ್ಗದರ್ಶನ ಮತ್ತು ದೃಷ್ಟಿಕೋನದ ಅಗತ್ಯವನ್ನು ಸ್ಪಷ್ಟಪಡಿಸಿದರು.
ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಉತ್ತಮ ಗ್ರಂಥಗಳನ್ನು ಓದಿ ಜ್ಞಾನವನ್ನು ಗ್ರಹಿಸಿ, ತಮ್ಮ ಕ್ಷೇತ್ರದಲ್ಲಿ ಯಶಸ್ಸು ಸಾಧಿಸಿ ಸದ್ಗತಿಯತ್ತ ಸಾಗಲು ಪ್ರೇರೇಪಿಸಿದರು. ಜೊತೆಗೆ ಸಂಸ್ಕೃತಿಯ ಅರಿವು, ಮತ್ತು ಸ್ವವಿಕಾಸದ ಮಹತ್ವವನ್ನು ವಿವರಿಸಿದರು.
ಕೊನೆಯಲ್ಲಿ, ವಿದ್ಯಾರ್ಥಿಗಳು ಡ್ರಾಮಾ ಪ್ರದರ್ಶನ ಮತ್ತು ಸ್ಕಿಪ್ಟ್ ಚಟುವಟಿಕೆಯ ಮೂಲಕ ವಿಷಯವನ್ನು ಇನ್ನಷ್ಟು ಸ್ಪಷ್ಟಪಡಿಸಿದರು. ಅವರು ಸಕ್ರಿಯವಾಗಿ ಪಾಲ್ಗೊಂಡು ತಮ್ಮ ಅಭಿಪ್ರಾಯಗಳನ್ನು ವ್ಯಕ್ತಪಡಿಸಿದರು.
ಅವರು ಹೇಳಿದರು:
'ರಾಷ್ಟ್ರದ ವೃದ್ಧಿ, ಸಮೃದ್ಧಿ, ಮತ್ತು ಸ್ವರೂಪವನ್ನು ಉತ್ತಮಗೊಳಿಸಲು ಶ್ರದ್ಧಾಭಾವ, ಸ್ಪಷ್ಟದೃಷ್ಟಿ, ಮತ್ತು ನಿಷ್ಠೆ ಅಗತ್ಯ'.

Appendix D

Table D1

Detailed Demographic Information of Typically Developing Participants

Participant	Passage	Age (Years)	Class / Educational Level
1	P1	8	Class 3
2	P1	8	Class 3
3	P1	9	Class 4
4	P1	9	Class 4
5	P1	10	Class 5
6	P1	10	Class 5
7	P1	11	Class 6
8	P1	11	Class 6
9	P1	12	Class 7
10	P1	12	Class 7
11	P2	13	Class 8
12	P2	14	Class 9
13	P2	14	Class 9
14	P2	15	Class 10
15	P2	15	Class 10
16	P2	15	Class 10
17	P2	16	Class 11
18	P2	16	Class 11
19	P2	16	Class 11
20	P2	16	Class 11
21	P3	23	Adult
22	P3	24	Adult
23	P3	24	Adult
24	P3	25	Adult
25	P3	31	Adult
26	P3	32	Adult
27	P3	35	Adult
28	P3	39	Adult
29	P3	39	Adult
30	P3	50	Adult

Note. P1 = Primary-level passage; P2 = Secondary-level passage; P3 = Adult passage.

Table D2

Detailed Demographic Information of Participants with Stuttering

Participant	Passage	Age (Years)	Class / Educational Level
1	P1	12	Class 7
2	P1	11	Class 6
3	P1	10	Class 5
4	P1	11	Class 6
5	P2	13	Class 8
6	P2	15	Class 10
7	P2	14	Class 9
8	P2	15	Class 10
9	P3	29	Adult
10	P3	24	Adult
11	P3	30	Adult
12	P3	25	Adult

Note. P1 = Primary-level passage; P2 = Secondary-level passage; P3 = Adult passage.

Table D3

Detailed Demographic Information of Participants with Speech Sound Disorders

Participant	Passage	Age (Years)	Class / Educational Level
1	P1	10	Class 5
2	P1	11	Class 6
3	P1	9	Class 4
4	P2	14	Class 9
5	P2	13	Class 8
6	P2	15	Class 10
7	P3	45	Adult
8	P3	56	Adult
9	P3	58	Adult

Note. P1 = Primary-level passage; P2 = Secondary-level and passage; P3 = Adult passage.

APPENDIX E

All India Institute of Speech and Hearing
(An autonomous Institute under the
Ministry of Health and Family Welfare, Govt. of India)
Center of Excellence - Assessed & Accredited by NAAC with 'A' Grade
ISO 9001:2015 Implemented Institute
Manasagangothri, Mysuru-570006

ಅಖಿಲ ಭಾರತ ವಾಕ್ ಮತ್ತು ಶ್ರವಣ ಸಂಸ್ಥೆ
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मानसगंगोत्री, मैसूरु - 570 006

INSTITUTE REVIEW BOARD (IRB) APPROVAL FOR BIO-BEHAVIOURAL RESEARCH PROPOSAL INVOLVING HUMAN SUBJECTS AT AIISH

AIISH Institute Review Board (IRB)

Ref: SH/IRB/M.5/SLP.40/2025-26 **Date: 11.03.2026**

Title of the Dissertation	: Development Of Cluster-based Connected Passages In Kannada
Name of the Student	: Ms. Vidya H S
Guide	: Dr. Sangeetha Mahesh
Co-Guide (if any)	: Nil
Proposed Duration of the Project	: 06 months
Source of funding	: Non-funded Master's dissertation
Estimated budget	: Nil
Reference Number of the Project	: Nil
Date on which the IRB meeting was held	: 05.03.2026
A clear statement of the decision reached IRB meeting (In the event of the proposal is not APPROVED, a statement of reasons for the same must be indicated)	**: APPROVED**
Advice & suggestions (if any)	: Nil

Signature & Name of the Member Secretary-IRB
Dr. Animesh Barman
Professor of Audiology
All India Institute of Speech and Hearing, Mysore-570006
सदस्य सचिव / Member Secretary
संस्थागत समीक्षा बोर्ड
Institutional Review Board
अखिल भारतीय वाक् श्रवण संस्थान
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