

DISSERTATION TITLE

**EFFECT OF ISL E-MODULE ON TEACHER TRAINEES' LEARNING
OF SUBJECT-SPECIFIC SOCIAL SCIENCE CONTENT**

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University of Mysore



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JUNE, 2026

CERTIFICATE

This is to certify that this dissertation entitled **“Effect of ISL E-Module on Teacher Trainees’ Subject-Specific Social Science Content”** is a bonafide work submitted as part of fulfilment of the degree of **Master of Education – Special Education (Hearing Impairment)** of the student with Registration Number **P01II24E012002**. 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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CERTIFICATE

This is to certify that this dissertation entitled "Effect of ISL E-Module on Teacher Trainees' Learning of Subject-Specific Social Science - Content " 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 "**Effect of ISL E-Module on Teacher Trainees' Learning of Subject-Specific Social Science Content**" is the result of my own study under the guidance of Dr. Prithi Venkatas, Associate Professor Department of Special Education, 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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List of Frequently Used Abbreviations

ISL – Indian Sign Language

HI– Hearing Impairment

CWSN– Children with Special Needs

HOLME – Handshape, Orientation, Location, Movement, Expression

ISLRTC – Indian Sign Language Research and Training Centre

NCERT – National Council of Educational Research and Training

NIOS – National Institute of Open Schooling

NEP 2020 – National Education Policy

RPWD 2016 – Rights of Persons With Disabilities

UNCRPD–United Nations Convention on the Rights of Persons with Disabilities

AAC – Augmentative and Alternative Communication

L1 – Finger Spelling

L2–Context-Based Signing

L3 –Target Sign Production

HS –Handshape

OR – Orientation

LOC – Location

MOV –Movement

OV –Overall

TM– Time

L– Level

TOT– Total

PR– Pre Test

PO– Post Test

ABSTRACT

The present study aimed to develop and evaluate an Indian Sign Language (ISL) E-Module for improving the learning and production of subject-specific historical personality name signs among B.Ed. Special Education (Hearing Impairment) teacher trainees. The study focused on the History lesson “*Ancient Dynasties of North India*”

from the Karnataka State Social Science Textbook for 6th standard (Second Term). Historical personality names from the selected lesson were identified and validated by experienced social science teachers working with students with hearing impairment. Based on the validated list, an ISL E-Module was developed incorporating visual representations, factual information, and sign demonstrations for 18 historical personalities.

A pre-experimental single-group pre-test and post-test design was adopted. The sample comprised 17 B.Ed. Special Education (HI) teacher trainees from the All India Institute of Speech and Hearing (AIISH), Mysuru, selected through purposive sampling. Sign production performance was assessed before and after the intervention using a researcher-developed assessment tool with three response levels: Finger Spelling, Context-Based Signing, and Target Sign Production. Accuracy was evaluated using the HOLM parameters—Handshape, Orientation, Location and Movement—while sign production time was also recorded.

Data were analyzed using descriptive statistics and the Wilcoxon Signed-Rank Test. The findings revealed statistically significant improvements in participants’ performance across response levels, HOLM parameters, sign production time and overall scores following the intervention. The study concluded that the ISL E-Module was effective in enhancing the learning, retention and production of subject-specific historical personality name signs. The findings underscore the need for subject-specific ISL resources to strengthen teacher preparedness for teaching Social Science to students with hearing impairment.

Keywords: Indian Sign Language, E-Module, Historical Personality Name Signs, Teacher Trainees, Hearing Impairment, Social Science.

CHAPTER 1

INTRODUCTION

1.0 Policies Supporting Sign Language

The National Education Policy 2020 is a fundamental overhaul to India's education system, emphasising inclusiveness, equity, accessibility and quality teacher education. In addition to emphasising the significance of developing qualified teachers and special educators to handle a variety of learning demands, the policy promotes fair educational opportunities for Children With Special demands (CWSN), including pupils with hearing impairments. One of the most progressive aspects of this policy is the recognition and promotion of Indian Sign Language (ISL) as an important medium of instruction and communication for deaf and hard-of-hearing students. The policy also highlights the need for effective pre-service teacher training, accessible learning resources, proper teacher preparation and the use of inclusive and supportive teaching practices to ensure meaningful learning for all students. For successful teaching, meaningful classroom interaction and better learning outcomes, teacher candidates and educators must develop subject-specific ISL abilities.

The Ministry of Education has worked with the Indian Sign Language Research and Training Centre (ISLRTC) and the National Council of Educational Research and Training (NCERT) to create educational materials based on ISL in order to operationalise this aim. Notably, efforts have been made to make curricular content accessible to deaf and hard-of-hearing students, instructors and sign language users, such as the creation of an ISL video dictionary with over 10,000 words and the translation of NCERT textbooks into ISL. These initiatives improve future teachers' linguistic readiness for successful classroom instruction in addition to bridging communication gaps.

The Rights of Persons with Disabilities Act, 2016 offers a robust legislative framework for inclusive education, special education and accessibility that supports the National Education Policy 2020. In addition to emphasising the training and hiring of teachers, interpreters and other professionals who are skilled in sign language, the Act requires governments to promote Indian Sign Language throughout the educational, healthcare, media and legal institutions. This legal requirement highlights the significance of the Indian Sign Language Research and Training Centre as the highest authority in charge of ISL research, instruction, standardisation and resource development. By connecting NEP 2020 with the RPWD Act

2016, India has established a comprehensive framework that integrates legislative requirements with educational inclusiveness. This guarantees deaf students and professionals working in deaf education systemic support.

Recent research has further strengthened this policy direction. The article, “National Education Policy 2020 & UDL Teacher Preparation,” published in the International Journal of Innovative Research in Technology (Rani A., 2024), discusses how the National Education Policy (NEP) 2020 supports schools to assist students who come from various cultural backgrounds (multi-cultural) and/or need some special assistance (special educational needs). For example, through Universal Design for Learning (UDL), preparing teachers to accommodate all students will result in a better opportunity for positive outcomes (successful student outcomes), particularly in subjects such as social studies that require a clear understanding of what is being taught and an enhanced level of accessibility.

To provide appropriate and effective instruction and learning environments for Deaf and Hard-of-Hearing (DHH) children, teacher candidates must develop the communication skills needed to educate this population of students using Indian Sign Language (ISL) and have an expert level of content knowledge of the subject(s) they teach.

Thus, the incorporation of ISL in teacher education programs is both a pedagogical and policy requirement. The strategic educational intervention is the development of e-modules based on ISL that will support teacher candidates with subject-specific and pedagogical language and teaching skills. These sections can be designed to create effective materials for teachers. They bridge the divide between educational policies and actual experience, making it easier for future teachers to provide equitable and just opportunities to learn. Research and published findings from the Indian Sign Language Research Training Centre have supported this position, confirming that organised instruction in ISL has a place in education. Furthermore, the research indicated that we also need ASL resources and qualified educators who are proficient in ASL to assist with instruction.

International Laws and Policies Supporting Sign Language

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), adopted in 2006, recognises that teaching and communicating in a way that is understandable and inclusive of deaf children and young adults can provide equal opportunities for receiving a quality education. Articles 21 and 24 of the UNCRPD call for all deaf students to be

provided with adequate teacher training and other education support, as well as to have sign language used and promoted in education programs. Additionally, the UNCRPD emphasizes that there must also be accessible teaching-learning strategies systems in place for all children and youth with hearing disabilities so that they may have an equal opportunity to receive a quality education. Therefore, these international obligations will allow for a robust foundation for the inclusion of Indian Sign Language (ISL) in teacher training programs and classroom pedagogy.

Even after a lot of hard work, teacher candidates still do not have an adequate preparation for some subjects under ISL. The language aspects of ISL, its grammar is often not taught within teacher education programs as they view it as being made up of separate components. This means that Deaf pupils will have difficulty communicating in the classroom due to the lack of accessibility and inclusion, which leads to lower academic success. The difficulties are most obvious in social science subjects, such as history, where the interpretation of abstract and historical information will require a clear concept and verbal expression and comprehension. The majority of the social sciences use language as the main form of presentation and will be challenged to convey those concepts correctly without developing the required subject specific ISL vocabulary. In contrast, the majority of the sciences use demonstrations to explain concepts while mathematics uses problem solving to present ideas.

There is an increasing need to incorporate subject-specific ISL training into all teacher preparation programs as evidenced by international standards and national educational policy converging in the same direction. The development of ISL-based e-modules for social science in India represents an opportunity for effective educational intervention aimed at aligning India's inclusive/special education agenda with global standards such as the United Nations Convention on the Rights of Persons with Disabilities, adopted on December 13, 2006, and the United Nations Standard Rules on the Equalisation of Opportunities for Persons with Disabilities, adopted on December 20, 1993. Subject-specific language skills and effective teaching strategies will allow teacher candidates and special educators to develop necessary knowledge and abilities to provide accessible and meaningful learning environments for deaf/hard-of-hearing students and to help close the gap currently existing between policy and practice in the classroom.

1.1 Challenges in preparing teachers to provide subject specific ISL instruction

Many teachers struggle with adapting their teaching methods to cater for the wide variety of communication needs of students (inclusion and special education). Due to the fact that many teachers haven't undergone any training on how to deliver ISL through subject content, it can prove difficult to provide appropriate content to students. According to a study conducted by Amir, A.H, L. & Aziz, A.A. (2025), a number of problems arose for teachers providing subject specific ISL to their students such as: awkward, detached sign systems; problems with communicating; limited resources for vocabulary and knowledge of teaching sign supported teaching or learning strategies. In order to provide every student with an opportunity to learn, solutions to systemic issues require systematic approaches that invest in inclusive technologies, provide professional development to teachers and enforce policies.

According to Roberts and Mkulu (2023), students with hearing impairments in inclusive classrooms encounter many academic difficulties, including a lack of sign language interpreters, an absence of sufficient support services, and delays in comprehending the concepts being taught to them in the classroom; and Beveridge (1999) states that students who have special educational requirements have particular learning needs for which they need extra support and services from trained professionals. Furthermore, due to insufficient numbers of qualified sign language interpreters/instructors, communication between educators and students in the classroom and providing appropriate instruction to students with unique learning needs are severely compromised.

It is crucial to provide educators and teacher trainees with adequate training, resources and support to effectively utilize sign language in inclusive and special education settings. Strengthening sign language competence among educators can enhance communication, improve access to curriculum content and promote meaningful learning experiences for students with hearing impairment. In addition to improving educational outcomes, such efforts contribute to the creation of a more inclusive and participatory learning environment. Walker et al. (2022) emphasized the importance of effective pre-service training practices, including modeling and performance feedback, in developing teachers' knowledge and instructional skills for working with students with extensive support needs. Flores and Dada (2024) emphasized that structured training interventions contribute to improvements in professionals' knowledge, practical skills and self-efficacy. Their findings highlight the

importance of providing systematic training opportunities for educators and teacher trainees to strengthen communication competencies and instructional preparedness.

Special educators and sign language interpreters are crucial in advancing inclusive education. They greatly improve students' learning outcomes, topic comprehension, confidence, motivation and positive classroom engagement when given the time, training and support to develop their talents. According to Hsiu Tan Liu et al. (2024), sign language offers an additional avenue for language acquisition because it is a visual language that is accessible and barrier-free.

E-modules and other digital tools offer a potential answer to this problem. Although there are dictionaries and video glossaries, they don't always equate to pedagogical proficiency. Teacher candidates must learn how to use ISL to methodically explain curriculum-based material. Accordingly, the current study focuses on how an ISL e-module affects teacher candidates' acquisition of subject-specific social science knowledge.

1.2 Lack of Training Modules and Implementation of Sign Language in Classroom Teaching

Both inclusive and special education for students with hearing impairments are severely hampered by the lack of planned training modules and the poor integration of sign language into classroom instruction. Teachers frequently struggle to provide effective communication and instruction without enough pedagogical preparation, which creates challenges that affect learning results.

The study by Shoaib et.al. (2023) indicates that the recruitment, development of professionals and continuation of support of professionals in their career path is a process that is very complicated, and is therefore subject to adequate preparation, appropriate instructional resources, and adequate professional support throughout their career development. The article outlines many of the challenges that educators experienced when undergoing staff development training. As a result of this research, there is a need for an effective teacher training programme to develop sign language skills in educators.

According to the research conducted by Hosemann et.al. (2018) and Gangrade and Bharti (2020), sign language is the primary means of communication and transfer of information between students and teachers. As such, a teacher must have the ability to communicate effectively using sign language in order for the students to comprehend the material being

taught. According to Muzani and others (2022), the processes of teaching and learning will not be successful for both student and teacher if either party does not have adequate knowledge and skill in the use of sign language.

There are major obstacles that hinder the implementation of both Inclusive Education and Special Education due to limited training resources on how to properly implement an accessible sign language program within the classroom. Also there is a struggle to manage class activities and deliver directions in language that is comprehensible to deaf students of all ages – both to new trainees and teachers. These barriers provide evidence of the absolute necessity of providing for sign language as part of the instructional process. In order to provide a purposeful participation of students within their learning, it is absolutely essential that all teachers receive excellent quality training and additional resources in sign language. Additionally, teachers may have difficulty providing instruction in disciplines such as Social Studies (History) where conceptual understanding is key. There is a need for materials that include accessibility and content specific resources available for each subject's curriculum.

Developing a module for an ISL History e-learning system (which will focus primarily on historical individuals) will add value in terms of learning history. History will frequently benefit from the use of proper nouns, abstract concepts, and culturally significant vocabulary terms that do not have a direct equivalent in NGT. Through creating sign language modules that include relevant vocabulary for these topics, teachers can provide a means for deaf students to learn complex histories through the rich context of historical periods. These sign language modules will also help new teachers develop the skills necessary to teach inclusive and segregated classes while providing the tools to bridge the gap between educational policies and the classroom.

1.3 Need and Importance of E-Module

The rapid development of e-learning over the last few decades has made it possible to approach teacher education and professional training in a more thorough and inclusive manner. In this regard, creating e-modules in sign language is a creative way to improve the teaching skills of pre-service teacher candidates who work with deaf and hard-of-hearing students. Due to the visual and performative aspect of sign language, digital learning platforms offer an efficient way to practise and demonstrate subject-specific signals using interactive and easily accessible teaching resources.

According to Pawa (2024), learners and trainees frequently view traditional text-heavy teaching materials as boring and uninteresting. Multimedia components like text, pictures, animations and video demonstrations are incorporated into e-learning modules to improve comprehension and increase engagement through multisensory learning. The attention, comprehension, memory and practical application of sign language skills in the classroom can all be enhanced by such multimedia-based training.

To strengthen educational outcomes for children with hearing impairments, strengthen inclusive and special education practices and improve the learning experiences of teacher candidates, an Indian Sign Language (ISL) e-module centred on subject-specific Social Science content is essential. As a discipline, social science deals with difficult concepts about society, politics, history and human behaviour that call for understandable and straightforward communication. By offering visual, interactive and linguistically relevant resources that make learning more interesting, accessible and understandable for teacher candidates, an Indian Sign Language (ISL) e-module overcomes this gap.

Research into the linguistic structures of sign languages has shown that they are an independent and fully formed natural language, maintaining a specific set of rules and patterns, separate from the linguistic structures of spoken languages. Baker et al. (2016) indicate that sign languages exhibit physical and systematic linguistic elements such as their phonology, morphology, syntax and semantics, whereas signs are produced in a spatial and visual format rather than through sound and spoken language. As a result, sign languages cannot be considered as mere bodily movements; sign languages are established linguistic systems based upon rules that permit communication to take place within the Deaf community and throughout the world through the use of signed language. Baker et al. (2016) also indicate that sign languages have different regional varieties and/or countries, which manifest themselves in the development of cultural and regional rules of language. The linguistic structure of a sign language is therefore a significant source of knowledge for teachers, researchers and professionals working in the field of Deaf education and will allow them to develop successful teaching strategies and curriculum design to support Deaf learners. This knowledge further supports the need for the inclusion of knowledge about signed languages to enhance teacher preparation programs so that Deaf learners may improve communication access and educational success.

According to Wiyanarti and colleagues (2024), e-modules are useful tools for improving your teaching abilities and can provide interactive, adaptable, and student-centered measures when available as an online resource. Evidence from their study indicates that students become engaged when their curriculum and learning requirements are met, which makes quality-designed e-modules both more accessible to teachers and students and practical as an overall learning resource. Additionally, this demonstrates the necessity of including electronic instructional material within teacher education to further develop the effectiveness of teachers through the use of e-learning as part of the digital age.

According to Middleton (2010), professionals who serve individuals who are Deaf, especially those who work in education and healthcare organizations, must possess a minimum level of knowledge regarding sign language and Deaf culture so that they can assist these individuals in being successful and to ensure inclusive practices. Additionally, it has been suggested that the production of digital learning resources (e.g., e-modules) has the potential to improve student engagement because of the visual and interactive nature of the resource, resulting in increased opportunities for students to engage in autonomous learning. Thus, there is a need for developing appropriate, efficient and enjoyable instructional materials to strengthen inclusive and accessible learning experiences, especially within the social discipline areas.

This study is necessary because, despite NEP 2020's emphasis on sign language standardisation and promotion of regional sign languages, as well as the fact that national organisations like ISLRTC, NCERT and NIOS have created a number of resources, teacher candidates' subject-oriented ISL training is still insufficient. Instead of being utilised as a dynamic teaching medium, ISL is frequently limited to discrete vocabulary pieces. Therefore, it is anticipated that an e-module created to offer organised and interactive training in ISL related to social science will empower teacher candidates. It enhance inclusion and Special classrooms practice.

The design of an ISL e-module for history information, particularly historical figures, is the special emphasis of the current study. Proper nouns and culturally significant names are frequently used in history classes, necessitating accurate communication. The program will help teacher candidates better communicate historical narratives by developing interactive materials and ISL signs for this specialised vocabulary.

Handshape, orientation, location and movement—all of which are regarded as the core elements of sign making and comprehension—were the basis for the development of the assessment criteria for the ISL E-Module. According to William Stokoe (1960), these structural characteristics provide as the linguistic basis for sign languages. Three categories of sign production were also included in the assessment criteria: targeted signs taught during the intervention period, contextual signing and finger spelling.

Research has highlighted the importance of fingerspelling as a foundational strategy in sign language learning, particularly when learners are unable to recall or produce the appropriate lexical sign. According to studies (Lee & Secora, 2022), fingerspelling supports vocabulary building, communication and sign language learning for beginning signers. In addition, Geer and Keane (2018) found that teaching fingerspelling explicitly enhances the student's understanding and ability to produce signs, and therefore, promotes the student's ability to move from using separate handshapes to using signs naturally. Significant communication through signs used in the right context has also been considered a vital part of an individual's ability to use sign language because they will have the knowledge necessary to use signs functionally as opposed to simply memorizing them. In addition to there being a difference between producing a sign and producing a fingerspelled word, Emmorey et al. (2016) said that producing a sign and fingerspelled word require two different processes; motor and linguistic therefore it is important to evaluate both sign accuracy and production skills of the student. Therefore, assessing the teacher trainees at the various levels of fingerspelling, contextually used signs, and production of the target signs that have been introduced through an ISL E-Module, will be able to provide an overall assessment of their sign language ability to comprehend and express signs.

Aim of the study

The aim of the study is to develop and evaluate the effectiveness of an Indian Sign Language (ISL) E-module based on the Karnataka 6th standard textbook for enhancing subject-specific social science content knowledge among pre-service teacher trainees. The broader goal is to prepare future educators with the linguistic and pedagogical competence required to support deaf students thereby, foster inclusive as well special classroom practices.

Objectives of the Study

- To identify and select historical personalities' names and subject-specific vocabulary from the Karnataka state social science textbook of standard 6 (Second Term), History lesson "Ancient Dynasties of North India."
- To train pre-service trainees using the developed ISL-E module and provide them with structured exposure to subject-specific ISL communication strategies for them to effectively teach abstract historical content to students with hearing impairments and learn its efficacy.

Research Questions: What is the effect of an ISL E-Module on B.Ed special Education (HI) teacher trainees' ability to learn and use subject-specific (History) Karnataka textbook State Syllabus for Standard 6th (Second term) for students with hearing impairments?

Sub-Questions

- ❖ How does the ISL E-Module influence teacher trainees' recognition and understanding of abstract historical Personalities' sign names?
- ❖ To what extent does the ISL E-Module improve teacher trainees' classroom teaching practices using Indian Sign Language?

Hypothesis

- Ho (Null Hypothesis): There is no significant effect of the ISL E-Module on B.Ed Special Education (HI) teacher trainees' ability to learn and use subject-specific vocabulary of social science (History) Karnataka textbook State Syllabus for standard 6 for students with hearing Impairment.

Operational Definition

ISL E-Module

In the present study, the ISL E-Module (Indian Sign Language), is a video-based digital resource created to assist individuals with learning how to sign the names of particular historical figures through Chapter 12 (Ancient Dynasties of North India) of the Karnataka State Social Science Textbook for the 6th standard, second term. Additionally, the E-Module contains photographs of the historical figure along with fact-based information about that

individual and also includes video demonstrations of the created signs. The E-Module was used as the instructional intervention used to improve the understanding and production of historical personalities name signs among B.Ed. Special Education Teacher Trainees (Hearing Impairment).

Social Science Content Related to Specific Subjects

The historical personality names used for this project as content basis for the creation of the ISL E-Module and the evaluation of many participants' signs learning and production accomplishments were developed from Chapter 12, Ancient North India's Dynasties, of the Karnataka State Social Science Textbook for 6th Grade (Second Semester).

Teacher Trainees

In the present study, social sciences are considered to be content-based upon the historically important figures from Chapter 12 of the Karnataka State social science textbook 6th standard (Second term) Historical Figures. The historically important figures in this chapter of social sciences will also be the basis of both ISL E-Module development and assessed for the learning and performing of those individuals' signs.

Effect

In the current research, effect means an observable degree of improvement from initial performance (pre-Test) to final performance (post-Test) of participants' subject-specific historical personalities name sign learning and production after intervention of the ISL E-Module (as measured by comparing response level performance (Finger Spelling, Contextual Signing and Target Signing production), HOLM parameters (Handshape, Orientation, Location and Movement).

CHAPTER 2

REVIEW OF LITERATURE

2.0 Historical Perspectives on Deaf Education

The historical debate over how to best educate Deaf people (manual signs vs. oral) has directly impacted who ultimately had control over instructional choice, how Deaf children develop their language skills, and the extent to which they develop as culturally Deaf people. Manual approaches to educating Deaf people and developing their culturally Deaf identity have traditionally been more heavily supported in Deaf education because of the role that manualism played in developing language and cultural identity. The oral method of educating Deaf children focused on the development of speech through training in the use of lip reading with the ultimate goal of integrating Deaf people with those who can hear. In fact, many early authors, such as Charles-Michel de l'Épée, advocated for and wrote about the advantages of using sign language for the formal instruction of students based on the use of signs to communicate (Gallaudet University Archives, n.d). However, there was a decline in the use of sign language as an option for formal education in the late 19th century due to the adoption of oralism as the primary mode of instruction and the Milan Conference (1880), which severely de-emphasized sign language as a viable mode of communication for Deaf students (Lane, 1984). Subsequent research conducted into the study of Deaf people has provided significant evidence to support the argument that sign languages are complete, completely natural languages, and have significantly hindered the development and learning of Deaf individuals (Humphries et al., 2014).

2.1 Challenges Faced by Teachers in Educating Learners with Hearing Impairment

The role of teachers and special education professionals within schools that serve Deaf children as educators and communicators greatly contributes to successful interactions and learning. However, many of these educators are presented with challenges due to their limited ability to use Indian Sign Language (ISL) as well as visual teaching materials and methods/approaches used in the education of Deaf children. Communication barriers have a significant negative impact on the interaction between educators and their Deaf students, which results in unsuccessful academic progress for the Deaf population (Humphries et al., 2014). The World Federation of the Deaf states that in order for Deaf children to receive a quality education, access to sign language and a trained interpreter is required (2016).

Similarly, the National Education Policy (2020) emphasizes the need to provide increased instructional support to teachers in the areas of ISL and inclusive practices across both special and general education systems. Collectively, these studies imply that improving the skills of special education professionals and future teachers in ISL will result in improved instructional delivery in schools for Deaf students.

According to (Sarkar & Ghosh, 2024) a review of literature revealed that students with a hearing impairment at a post-secondary institution face many barriers to participate in their education including difficulties with communication, availability of accessible resources, and a lack of institutional support. The findings indicate that accessibility and educational outcomes of students with disabilities can be enhanced through the use of inclusive instructional strategies, assistive technology, and increased commitment from the institution.

The implementation of ISL in deaf education is increasingly important, according to the research conducted by Zeshan et al (2005), because it emphasizes that ISL should be included systematically into all areas of the curriculum, classroom teaching and teacher preparation, and the lack of trained professionals and standardized instructional materials limits the efficient application of ISL in schools. The authors conclude that if ISL were considered to be a medium of instruction, this would greatly enhance accessibility, involvement and the overall quality of education received by deaf students in India.

2.2 Policies and Frameworks Supporting Sign Language

The National Education Policy (NEP) 2020 represents a landmark and systemic change in the education system in India by focusing on inclusiveness, accessibility, multilinguality, etc. The NEP 2020 seeks to incorporate the teaching of Indian Sign Language (ISL) into the general education system of India as a legitimate language while providing direction for the creation of resources to teach using ISL and equitably preparing teachers to teach persons with hearing impairments.

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) reiterates the global commitment to the inclusion of sign language. According to Article 21, 24, and 30 of the Convention, sign language is critical to ensuring that persons with disabilities can freely express themselves and have access to educational opportunity and participate fully in their cultures and communities. The UNCRPD defines sign language as a legal right of access to education for deaf individuals.

The UNCRPD has been established by the UN General Assembly on 13 December 2006 as one of the most important global frameworks that protect the rights of people living with impairments/disabilities. The UNCRPD makes it clear that the government must take all steps to promote and protect the equal participation of persons with disabilities and that equal participation of persons with disabilities must be achieved through all areas of society. The UNCRPD also stresses the value of sign language in the education of children (and youth) with hearing impairments and supports its inclusion in formal educational systems.

The Rights of Persons with Disabilities (RPWD) Act of 2016 provides a strong legal framework for accessibility, inclusive education and special education in India. Among other things, the RPWD establishes legally binding obligations on governments to promote the use of sign language in education, health, media and judiciary, and requires that teachers, interpreters and other practitioners receive appropriate training in sign language.

The Indian Sign Language Research and Training Centre (ISLRTC) is a statutory body under the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment, that works to promote, standardize and develop materials/resources for using Indian Sign Language (ISL). ISLRTC has developed several initiatives, including providing dictionaries of sign language, training programs and instructional materials to help increase accessibility to communication for Deaf people (in India).

Recent changes in Assam show an important and modern development leading to greater awareness and official recognition of Indian Sign Language (ISL) within the school educational system in general. Assam becomes the first Indian state to implement ISL as an optional subject for Seniors, Classes XI & XII in the school educational system beginning in the academic year 2025–26. This marks a significant step towards advancing inclusive education practices for individuals who are deaf/hard of hearing by promoting accessibility for learners with a hearing impairment. The introduction of ISL as an elective subject for Classes XI & XII aligns with both the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCFSE) 2023, which both support the ideas of equity, inclusion, and integration of ISL into general education. Moreover, providing ISL as a course at the senior secondary level is expected to promote increased social awareness regarding Deaf culture and the communication needs of Deaf individuals and is anticipated to improve the attitudes and perspectives of hearing students toward Deaf people. The development of structured curricular resources such as the Fundamentals of Sign

Language provided by the Assam State School Education Board, Division II (2025), provide an additional strength to the institutional support system for the implementation of ISL in education in Assam and are intended to demonstrate the state's commitment to inclusive and equitable opportunities to learn.

2.3 Studies Related to ISL, AAC and Inclusive Communication

Bintoro, T. et al. (2023) have conducted a qualitative descriptive research focused on the sign language learning strategies utilized in teaching Deaf students in Jakarta to better understand how they facilitate learning for their students. The researchers collected data via interviews of 5 Deaf students and 10 Deaf students' teachers as well as observations of Deaf students' classrooms. Through interviews of 5 Deaf students and teachers as well as classroom observations, Bintoro's study found that teachers utilized two primary approaches when teaching Deaf students; the speech method where spoken language is combined with signs and the manual method which only uses sign language. Both approaches were shown to have positive impacts on Deaf students' communication skills as well as their participation in the classroom. In addition to confirming the positive impact of both methods, the study highlighted the need for teacher training which is specific to working with Deaf students.

Flores and Dada (2024) conducted a scoping review of augmentative and alternative communication (AAC) professional development training programs. The scoping review included 34 studies examining the impact of AAC training on professionals and reported an overall increase in knowledge of AAC, ability to teach students who are learning to communicate through AAC devices, and confidence to provide support to their students using AAC. The results of the scoping review further emphasized the importance of establishing goals for AAC professional development, developing instructional materials for those that are receiving AAC professional development, and providing structured professional development opportunities as mechanisms of improving overall communication support practices.

In the study by Andziak et al. (2017) on special education professionals' views of AAC for individuals with IDD, data were gathered from 14 teachers through 14 qualitative interviews. Major barriers to AAC implementation included insufficient training for teachers, not having enough time to prepare for use of AAC in the classroom, and team members not using AAC consistently. The authors stated that effective AAC implementation requires an organized system of professional development, as well as collaboration among all team members.

The qualitative research conducted by Sibanda and Mhlanga (2024) at a primary school in Johannesburg investigated how ready teachers are to use AAC with students who have communication difficulties. The results indicated that teachers believe they do not have enough preparation to implement AAC due to a lack of training and, in many instances, limited resources, and high rates of staff turnover. This research highlights the need for ongoing professional development for teachers, support within the classroom for teachers, and the use of AAC in the home environment as keys to achieving improved communication outcomes for AAC users.

2.4 Teaching-Learning Materials and Technology in Deaf Education

The use of sign language involves visual-gestural methods which consist of various signalling devices including hand signals, facial expressions, and movement of the body. Indian Sign Language (ISL) is normally used by persons who are deaf or hard of hearing in communication in India. The Indian government has recognized the value of using sign language as a means to participate socially and academically through the creation of the Indian Sign Language Research and Training Centre (ISLRTC) to promote the use of Indian Sign Language, as a standard means of communicating, by establishing a vocabulary, and developing appropriate teaching materials.

Technology has shown the possibility to greatly reduce barriers to communication for deaf students through the use of captioned video-based instructional messages and digital platforms (e.g., interactive whiteboard, mobile applications, real-time avatars moving in sign language) which have the potential to provide a more dynamic, accessible, and visually stimulating learning environment for the student. Ulrich et al., (2024) state that technology-based instructional tools allow for a more dynamic, accessible, and visually stimulating classroom.

The ISLRTC's Indian Sign Language Dictionary is a significant milestone in the documentation and standardisation of ISL. The dictionary, first launched in 2018 with 3,000 signs, later expanded to over 10,000 signs by 2021 and includes academic, legal, technical, banking and medical vocabulary. The dictionary is also accessible in video format with subtitles and audio support via DIKSHA and PM e-Vidya channels. The resource is an important tool in teacher preparation, interpreter training, and curriculum-aligned instruction.

The National Institute of Open Schooling (NIOS) has released an ISL textbook for secondary education to promote inclusive and accessible education for hearing impaired and normally developed children. The textbook includes lessons on ISL grammar, vocabulary, conversational skills, Deaf culture and communication practices to develop linguistic competence and cultural awareness.

Additionally, ISL versions of NCERT textbooks of Classes I to XII have been prepared by National Council of Educational Research and Training (NCERT) in association with ISLRTC. These resources are available in video format with trained interpreters, teacher, subtitles and audio help. The initiative seeks to enhance curriculum accessibility and encourage the incorporation of ISL into mainstream education.

2.5 Teacher Training and Professional Development in Sign Language Instruction

Professional development is important in increasing teachers' instructional competencies in deaf education. Research grounded in bilingual–bicultural approaches views sign language as a fully accessible first language that promotes literacy development and conceptual understanding in deaf learners.

According to Marschark et al (2005), the success of students who are deaf with their classroom educational experience depends a lot on how well their teachers communicate and how well the environment supports the use of sign language and visual support. In their study, they discover that offering the structured instructional support and the right communication techniques (for instance, sign language for teaching) will enhance the comprehension and learning outcomes of the deaf students. In addition, Marschark et al. point out that, when it comes to preparing teachers to teach deaf children, the provision of systematic and long-term instructional support has a greater impact on teachers' ability to use effective teaching methods than the use of isolated or short-term training sessions.

The Indian Sign Language Research and Training Centre does a lot of work to help teachers and students. They have programs that use videos and computers to teach Indian Sign Language. These programs can really help teachers do a job of teaching Indian Sign Language. Most of the time people who study this look at how it helps with reading and talking not with teaching specific subjects.

The Annual Report from the Indian Sign Language Research and Training Centre for 2023–24 says they are working hard to train teachers and interpreters. They are also making

applications expanding the dictionary and standardizing the vocabulary of Indian Sign Language. The Annual Report also talks about the problems they are still having like not having interpreters teachers not being prepared and Indian Sign Language not being used enough in regular classrooms, with Indian Sign Language.

2.6 Social Science Pedagogy and Subject-Specific ISL Learning

Social Science is a subject that needs a lot of words to explain ideas. It involves understanding concepts interpreting them and communicating effectively. History, Political Science, geography and social structures are some of the topics that have ideas. These ideas can be hard to explain without using words and visual aids. Social Science is different, from Science and Mathematics. It relies more on telling stories and using language to represent ideas. Social Science topics need explanations and examples to help students understand. The subject uses a lot of narrative to convey information and make points. This approach helps students grasp ideas in Social Science.

Kathuria and Chauhan in 2021 studied how Indian Sign Language helps students with hearing loss learn science in schools in Delhi. They used a study method that included tests before and after teaching with Indian Sign Language. The results showed that students did better in science after learning with Indian Sign Language. Students understood the content better. They learned science words. They became more aware of ideas and terms. The study also found that deaf students often have trouble learning because of communication barriers. When teachers use the students first language they do better in school. Even though this study was about science it shows that Indian Sign Language can help in subjects too. The results suggest that we need to create Sign Language resources for Social Science. This can help students with hearing loss understand concepts learn vocabulary and participate in class. Research on teaching students has shown that without special sign language, for each subject they may struggle to understand concepts. They may have trouble interacting in class. Historical figures, political ideas and cultural topics need teaching methods that make sense and use the right language. This helps deaf students have learning experiences.

Recent studies on Universal Design for Learning and inclusive teaching show that visual methods, interactive resources and accessible materials are important in Social Science education. These studies also suggest that teacher trainees need to know sign language and how to teach effectively to help deaf and hard-of-hearing students learn Social Science.

In this context e-modules that use Irish Sign Language and focus on Social Science may help teachers by combining communication, key vocabulary and interactive strategies. Such tools can help teachers understand Social Science concepts better communicate effectively in the classroom and feel more prepared to teach in both regular and special education settings with a focus on Universal Design, for Learning and Social Science education.

2.7 Research Gap

The research that has been done shows that a lot of work has been done to help Sign Language and to make sure that deaf students get a good education. People have looked at the problems that deaf students face when it comes to communicating and getting to the things they need. They have also looked at how Indian Sign Language's being used and how to help teachers get better at working with deaf students.

There are a lot of things that schools and other places are doing to help students. For example they are making dictionaries for Sign Language and special textbooks. They are also making resources that can be used to learn. All of these things are helping to make sure that deaf students and students who are hard of hearing can get an education. Indian Sign Language is very important for students and for the people who teach them like teachers and interpreters. The research says that teachers need to be trained in Sign Language so they can teach deaf students in a way that works for them. Indian Sign Language and teacher training are very important, for making sure that deaf students get an education.

However, limited research has been conducted on the development and effectiveness of subject-specific ISL e-modules for teacher trainees, particularly in the area of Social Science education. Most existing studies focus on general communication skills, AAC implementation or literacy instruction, while comparatively little attention has been given to subject-specific ISL vocabulary and pedagogical preparation in pre-service teacher education.

Furthermore, research specifically addressing the teaching of historical concepts and personalities through ISL remains scarce. There is also a lack of studies examining how ISL-based digital learning resources can enhance teacher trainees' learning of subject-specific Social Science content.

Therefore, there exists a need to develop and evaluate an ISL-based e-module aimed at improving teacher trainees' learning of Social Science content and strengthening their instructional preparedness for teaching learners with hearing impairment.

Methodology

The methodology of the study comprises the research design, population, sample, tool development, procedure for data collection and procedure for data analysis.

3.0 Research Design

The present study adopted a pre-experimental research design using a single-group pre-test and post-test design.

The design of the study is represented as:

O_1 X O_2

- **O_1** : Pre-test
- **X** : ISL E-Module Intervention
- **O_2** : Post-test

In the present study, a single group of B.Ed. Spl. Edu. (HI) II and IV semester teacher trainees was selected as participants. The intervention consisted of an ISL E-Module developed for subject-specific social science content from the Karnataka State Social Science textbook of 6th Standard (Second Term). The effectiveness of the developed ISL E-Module was assessed by comparing the participants' pre-test and post-test performance in terms of response level, sign production parameters (HOLM), and response time.

3.1 Variables of the Study

The present study consisted of the following variables:

Independent Variable

The independent variable of the study was the developed Indian Sign Language (ISL) E-Module based on the history lesson "Ancient Dynasties of North India" from the Karnataka State Social Science Textbook of 6th standard (Second Term). The E-Module served as the Intervention provided to the participants.

Dependent Variables

The Dependent Variables of the study were the participants' performance scores obtained during the pre-test and post-test assessment, which included:

1. Response Level Scores (Finger Spelling, Context-Based Signing, and Target Sign Production).
2. HOLM Parameter Scores (Handshape, Orientation, Location and Movement).
3. Time taken for sign production.
4. Overall sign production performance score.

The effectiveness of the ISL E-Module was determined by comparing the pre-test and post-test scores obtained on these dependent variables.

3.2 Description of the tool employed and details of sample selection and the participants

The tools and techniques used for the study, along with the details of sample selection, are discussed in this section. This section provides a detailed description of the participants selected for the study and the tools employed for data collection.

3.2.1 Selection of the Participants

The study was conducted in the following phases:

- The participants were selected purposively based on their specialization in Social Science pedagogy within the B.Ed. Special Education (HI) programme.
- The participants were studying in the II and IV semesters.
- A total of 17 trainees from II and IV semester B.Ed. Spl. Edu. (HI) programme were selected for the study.

The participants were selected based on the following criteria.

3.2.2 Inclusion Criteria

The following inclusion criteria were considered while selecting the participants:

- The participants should have knowledge of Social Science content.
- The participants should have basic knowledge of sign language as part of their B.Ed. syllabus.
- The participants should belong to B.Ed. Spl. Edu. (HI) II and IV semester.

- The participants should be willing to participate in the study.

3.2.3 Exclusion Criteria

The following exclusion criteria were considered:

- Participants who had completed any professional sign language interpretation course were excluded.
- Participants with advanced proficiency or professional expertise in sign language were excluded.
- Participants who had completed the B.Ed. Special Education (HI) programme were excluded from the study.
- Participants who were not from Social Science pedagogy were excluded.

3.2.4 Details of Tool Development

The content development for the present study was made based on the Karnataka State Social Science Textbook of 6th standard (Second Term). Among the other disciplines, the History component of the Social Science textbook was selected for the study. The researcher examined all chapters that were prescribed for the second term and classified the content into different domains like historical personalities, places, administration, art and architecture, education and universities, sculpture and paintings, trade and economy, literature and social conditions.

After the content analysis, the researcher checked the availability of existing signs for the identified words from various Indian Sign Language resources like Indian Sign Language Research and Training Centre (ISLRTC), Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI) and NCERT PM e-VIDYA ISL 31 resources . It was found that in this process signs for several content specific words had already been developed. However, the names of many historical personalities and place names from the selected chapter did not have standard signs in Indian Sign Language (ISL).

Based on this review, a preliminary list of historical personalities and place names was drafted from the selected lesson. Two types of words were initially established: (i) historical figures, (ii) place names. However, the present study only focused on names of historical

personalities, due to time limitations and the limited availability of Deaf consultants for sign development.

The Indian Sign Language (ISL) E-Module is prepared based on the content of Chapter 12, “Ancient Dynasties of North India”. The chapter was selected because it includes a great number of historical figures whose names are essential for the understanding of the historical content. Also, many of these names do not have any standard sign in ISL, which makes it difficult for teacher trainees to teach the concepts well to students with hearing impairment. Thus, the chapter was found to be suitable for the development of a subject-specific ISL E-Module.

The researcher studied the chapter in detail and made a preliminary list of names of historical personalities and related terms, which reached 57. The identified words were cross-checked with the existing ISL resources to check for the existence of standardised signs. Words which had already been developed signs were documented in the list, with the links to their sources, in order to refer to them and to evaluate how relevant and important they were for classroom teaching.

The first validation phase was carried out on the preliminary list of 57 words. The five experts participated in the validation process. The validators were Social Science teachers with more than five years of experience teaching History to students with hearing impairment. They reviewed the word list and evaluated the educational significance, relevance and necessity of each word for teaching Social Science content to learners with hearing impairment. (Appendix 1)

Based on the suggestions and recommendations provided by the validators, the list was refined and reduced to 25 important words. Further examination revealed that seven of these words already had established signs available through existing ISL resources. Consequently, these words were excluded from the final list. The remaining 18 historical personalities’ names, for which no standardized signs were available, were selected for the development of the ISL E-Module.

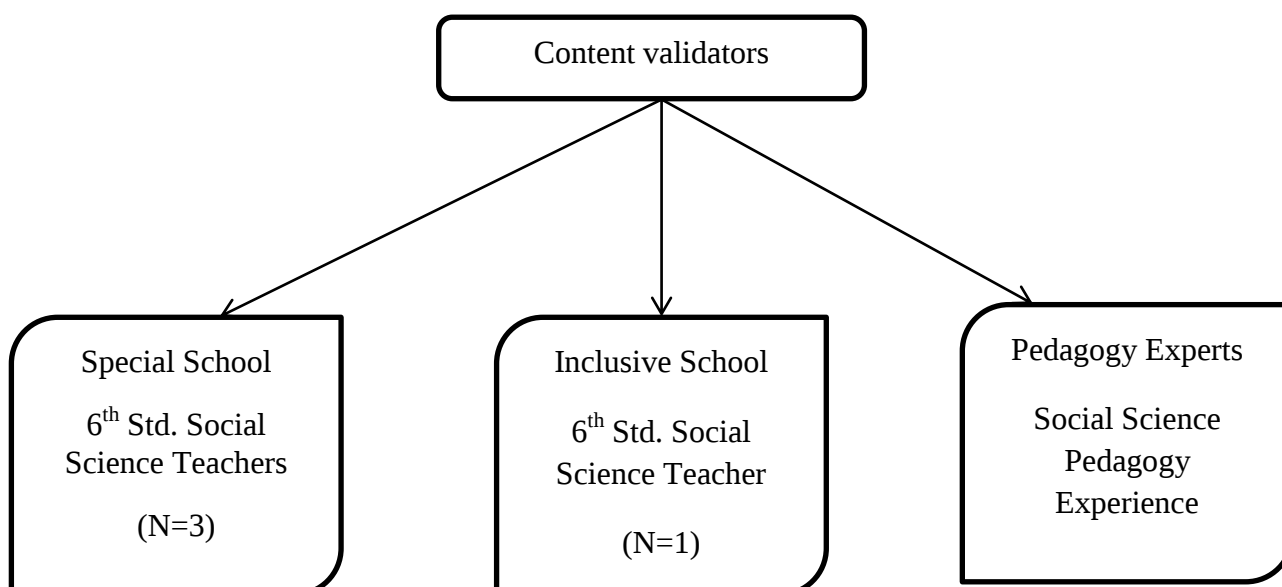
The finalized list of 18 historical personalities’ names was further validated by the experts for its appropriateness, curricular relevance and usefulness in teaching History content. All suggestions and recommendations received during the validation process were incorporated,

and the final validated word list served as the basis for the development of the ISL E-Module used in the present study (Appendix 2).

3.1 Details of Content Validators

Sr. No.	School Type	No. of Validator	Specialized	Standard
1	Special School (HI) 1	1	Social Science Teacher	6th
2	Special School (HI) 2	1	Social Science Teacher	6th
3	Special School (HI) 3	1	Social Science Teacher	6th
4	Inclusive School 4	1	Social Science Teacher	6th
5	Institute 5	1	Social Science pedagogy teaching experience	D.Ed Spl.Edu. (HI)
Total No.		5		

3.1 Distribution of Content Validators (Visual Representation)



The list of words selected for the development of the ISL E-Module was validated by five validators. Among them, three validators were Social Science teachers from special schools for students with hearing impairment and one validator was a Social Science teacher from an

inclusive school teaching sixth-standard Social Science content. Additionally, one specialist with experience in D.Ed. Special Education (HI) and Social Science pedagogy from a teacher education institution participated in the validation process. The validators examined the educational importance and relevance of the selected historical personalities' names.

3.3 Description of the E-Module

The Indian Sign Language (ISL) E-Module was developed by the researcher with the support and consultation of a Deaf individual. The primary purpose of the E-Module was to facilitate the learning of subject-specific historical personalities' name signs among B.Ed. Special Education (Hearing Impairment) teacher trainees. The module was developed using content selected from Chapter 12, "*Ancient Dynasties of North India*," from the Karnataka State Social Science Textbook of 6th standard (Second Term).

Initially, lists of historical personalities' names were identified from the selected chapter. The social science teachers who have been working with students with hearing impairment, for five years did a validation process. They picked 18 historical personalities names to put in the module. These historical personalities names were chosen after the teachers did their validation process on them. The historical personalities will be part of the module now. These words were selected based on their curricular importance and relevance for classroom teaching.

After finalizing the word list, the researcher collected appropriate photographs and relevant factual information related to each historical personality. The selected photographs and accompanying information were carefully reviewed and verified by a Deaf individual to ensure clarity, appropriateness, and ease of visual understanding. The researcher then explained the historical background, significance and contextual information of each personality to the Deaf consultant through Indian Sign Language. This process enabled the Deaf consultant to gain a clear understanding of the personalities and facilitated the development of meaningful and contextually appropriate sign representations.

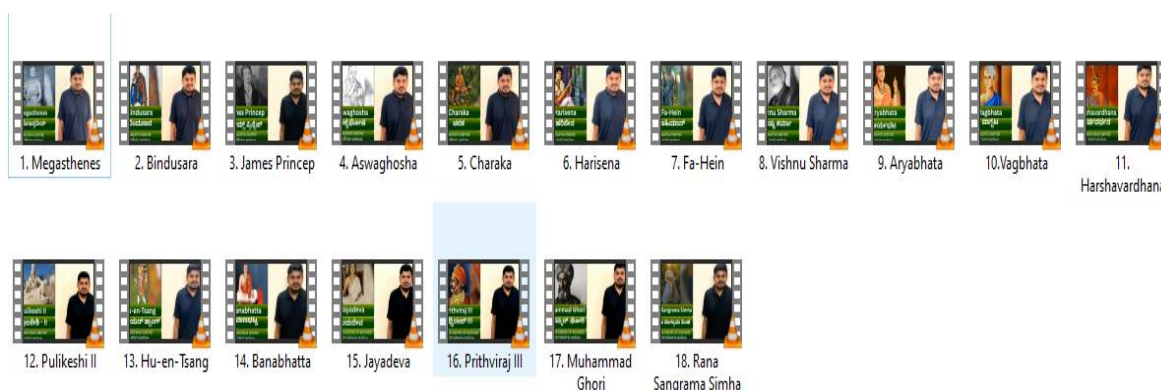
The E-Module was developed in a video-based format to provide a visual and accessible learning resource. Since sign language is most naturally and authentically represented by Deaf signers, all sign demonstrations in the module were performed by a Deaf expert. The selected Deaf individual had profound congenital hearing impairment, had completed B.Ed. Special Education (Hearing Impairment), and was pursuing M.Ed. Special Education

(Hearing Impairment). In addition, the individual possessed two years of teaching experience in a school for deaf students, which contributed to the educational suitability and authenticity of the sign representations.

Prior to video recording, informed consent was obtained from the Deaf expert. The researcher worked collaboratively with the Deaf individual throughout the sign development process to ensure that the signs were meaningful, visually clear and suitable for educational purposes. Several discussions and reviews happened before finalizing the signs for each personality.

Each video, in the E-Module had three parts: A photograph of the personality, the name of the personality. The corresponding dynasty name shown in English and Kannada, a video demonstration of the sign developed for the personality. The inclusion of photographs was intended to support visual memory and assist teacher trainees in associating the sign with the respective historical personality. The dynasty names were included to provide historical context and facilitate better conceptual understanding.

The duration of each video ranged from approximately 5 to 7 seconds. The videos were designed to be concise, visually engaging and easy to revisit multiple times during learning. The completed E-module served as the instructional material for the intervention phase of the study and was used to train B.Ed. Special Education (HI) teacher trainees in producing and understanding subject-specific historical personality name signs in Indian Sign Language.



The visual representation of the personalities was included to strengthen memory, conceptual understanding and sign recall during learning and practice sessions. The E-Module mainly focused on visual learning strategies suitable for learners and teacher trainees working in the field of hearing impairment.

During the development of the personality name signs, consultation and consent were obtained from Deaf experts and sign language users to maintain the appropriateness, acceptability, and clarity of the developed signs. The module was presented through video-based demonstrations, allowing participants to observe the handshape, orientation, location and movement of each sign clearly.(Appendix 5)

The developed ISL E-Module videos were uploaded to a Google Drive repository for easy access. A QR code was generated to enable users to directly access the E-Module videos. The QR code and Google Drive link are provided.(Appendix 6)

Use of Existing ISL Signs

The signs of some historical personalities were already developed and available at the Indian Sign Language Research and Training Centre (ISLRTC). For such signs, only the sign names were used during the intervention sessions with the B.Ed. Spl. Edu. (HI) teacher trainees. To ensure ethical use and avoid copyright-related issues, the original ISLRTC videos were not directly embedded or presented in the E-Module.

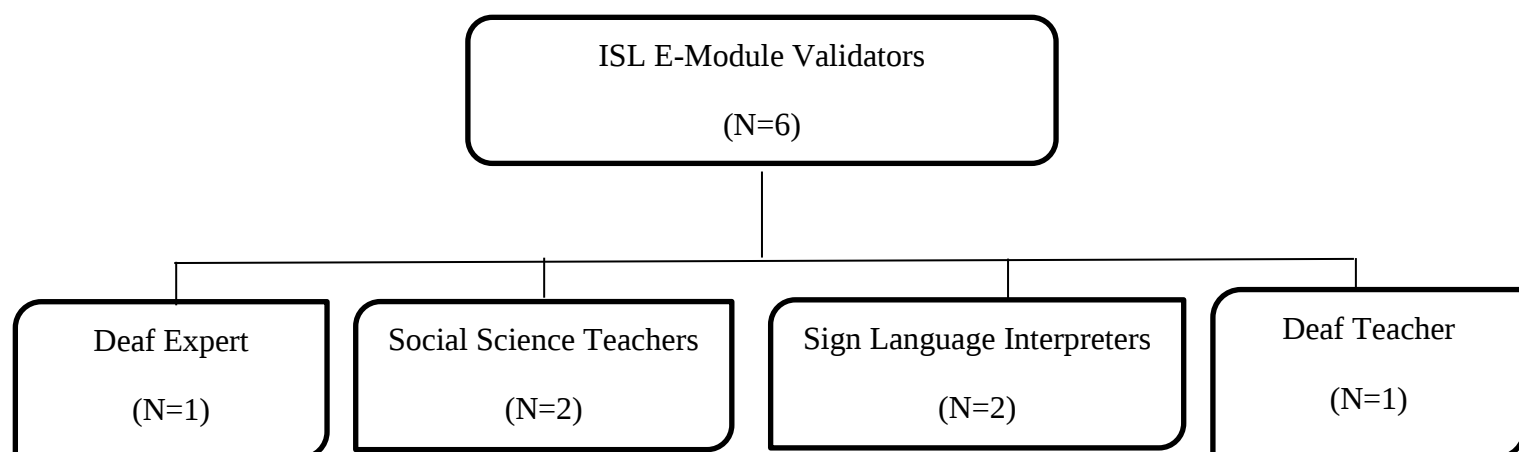
New sign names were developed only for those historical personalities for whom sign representations had not previously been developed. This work was carried out in consultation with Deaf experts and sign language users.

After the development of signs for the 18 words, the E-Module was subjected to a second round of validation. This validation was carried out by Deaf experts, sign language interpreters and school teachers. The final list of Historical personalities names included in the ISL E-Module is appended (Appendix 3)

3.2 ISL E-Module Validator

Sl. No.	Institution/ School	Category of Validator	No. of Validator	Suggestion	Incorporated	Unincorporated
1	Special School (HI)	Social Science Teacher	1	-		
2	Special School (HI)	Social Science Teacher	1	✓ 1	✓	
3	Institution	Sign Language Interpreter	1	✓ (2)	✓ 1	✓ 1
4	Institution	Sign Language Interpreter	1	✓ 1	✓	
5	Institution	Deaf Expert	1	✓ 1	✓	
6	Special School (HI)	Deaf Teacher	1	-		
Total No.			6			

Figure 3.2 Category-wise Distribution of ISL E-Module validators



A total of six validators participated in the validation process. Among them, two were Social Science teachers from special schools for children with hearing impairment, two were sign language interpreters and two were Deaf experts. The validators examined the appropriateness, clarity, educational relevance, visual presentation and suitability of the historical personalities' name signs included in the E-Module.

During the validation process, the experts provided several suggestions, such as including dynasty names along with the names of historical personalities. One Deaf expert suggested modifications in the handshape, orientation, and movement of a particular sign to improve its clarity and ensure better understanding and uniformity. One validator also suggested corrections in the spelling of Kannada words. Another validator suggested that only the specific sign for each historical personality was required and that fingerspelling was unnecessary, as the name of the personality was already provided. This suggestion was incorporated into the E-Module.

The same validator also suggested adding a specific sign for one historical personality. However, this suggestion was not incorporated into the E-Module. Upon discussion with a Deaf individual, it was found that the proposed sign had already been assigned to another historical personality. Therefore, the suggestion was not adopted to avoid sign duplication and potential confusion.

The suggestions and recommendations provided by the validators were incorporated while finalizing the ISL E-Module.

3.4 Development of the Blueprint

As the study aimed to improve the learning and production of subject-specific historical personalities' name signs among B.Ed. Spl. Edu.(HI) teacher trainees through an ISL E-Module, a blueprint was developed by the researcher for the systematic organisation of the content and assessment procedure. The blueprint provided a framework for the development of the E-Module, pre-test, post-test, instructional objectives and scoring procedure.

The blueprint was prepared based on the selected historical personalities' names. It included the distribution of content areas, response levels, assessment parameters and scoring patterns used in the study.

The blueprint incorporated response categories such as finger spelling, context-based signing and target signs. For assessing the quality and accuracy of sign production, selected parameters from the HOLME framework, namely Handshape, Orientation, Location and Movement (HOLM), were included in the assessment.

The parameter “Expression” was not considered in the present study, as facial expression was not clearly observable or consistently applicable while assessing historical personality name signs. In context-based signing, facial expression may occur naturally however, during the isolated production of personality name signs, expression was not found to be a significant observable parameter for evaluation.

The blueprint also included the time duration taken by the participants to produce the signs during both pre-test and post-test administration. The blueprint served as the basis for the development of the assessment tool and ensured alignment between the instructional objectives, intervention content, and evaluation criteria.

3.3 Distribution of Marks under Various Domains and Weightage

Sl. No.	Level	Description	Score Weight
1	L1 Finger Spelling	Spelling name using manual alphabet	1
2	L2 Context-Based Signing	Describing historian (e.g., “Famous physician”, “Bindusaraashoka’s father”)	2
Sl. No.	Level	Description	Score Weight
3	L3 Targeted Name Sign	Producing newly developed standardized sign	3
	Total		3*18= 54

The levels Means:

- **Level 1 (L1) – Finger Spelling:**

The first level focused on finger spelling, where participants used finger spelling when someone unable to produce the appropriate sign. Finger spelling is considered an important bridge for vocabulary development

- **Level 2 (L2) – Context-Based Signing:**

The second level assessed contextual signing, in which participants attempted to use signs relevant to the context for better understanding of words or concepts.

- **Level 3 (L3) – Targeted Sign:**

The third level focused on targeted signs that were specifically taught during the intervention period through the ISL E-Module. This level was included to measure the participants' acquisition and retention of the instructional signs introduced during the intervention.

3.4 HOLM Weightage Parameter

Sl. No.	Parameters	Appropriate	Inappropriate
1	Handshape	1	0
2	Orientation	1	0
3	Location	1	0
4	Movement	1	0
Total		1*4= 4	

The core parameters of sign language, such as handshape, orientation, location and movement, were selected to help learners understand the structure and production of signs. These parameters are considered fundamental components of sign language linguistics and are essential for accurate sign production and comprehension.

According to Stokoe (1960), sign languages consist of distinct linguistic parameters such as handshape, movement, and location, which function similarly to phonological units in spoken languages.

For assessing the quality of sign production, selected HOLM parameters, namely Handshape (HS), Orientation (OR), Location (LOC) and Movement (MOV), were used. Each parameter was scored as Appropriate (1) or Inappropriate (0).

The “Expression” component of the HOLME framework was excluded from the assessment criteria in the present study because the study focused on the isolated production of historical personality name signs rather than conversational or sentence signing. Facial expression was neither consistently observable nor functionally significant during isolated sign production. Therefore, only the parameters of Handshape, Orientation, Location and Movement (HOLM) were considered for evaluation.

Similar studies on isolated sign language recognition and assessment have primarily focused on manual sign parameters such as handshape, orientation, movement, and location (Hamdan et al., 2021).

The time taken by the participants to produce each sign was also recorded separately during both pre-test and post-test administration. The total score for each historical personality sign was calculated based on the response level and HOLM parameter scores.

3.5 Development of the Pre-test and Post-test

The pre-test and post-test were developed to assess the effectiveness of the ISL E-Module. The purpose of the pre-test was to assess the existing knowledge and sign-production ability of the participants before the administration of the ISL E-Module.

The tests were designed to evaluate the participants' performance across the three response levels, namely Finger Spelling (L1), Context-Based Signing (L2) and Target Sign Production (L3), along with the HOLM parameters and response time.

The pre-test was conducted individually for all participants selected for the study. It was administered to assess the production of signs, sign language parameters and the time taken by each participant to produce the signs related to historical personalities. The pre-test was conducted over a period of one week.

After the pre-test, a two-day break was given to the participants. Following this, the intervention programme was implemented. The intervention consisted of 10 sessions, with each session lasting 30 minutes. In each session, three sign words were introduced along with already developed signs to help participants understand the concepts more effectively.

The researcher explained the context and use of the signs during classroom instruction to improve understanding. The ISL E-Module also provided opportunities for repeated viewing and practice, which supported better learning and retention of the historical personality name signs.

After the intervention, the post-test was conducted individually to maintain confidentiality and proper documentation of the scores obtained. The duration and breaks during the post-test varied according to the participants' availability. The post-test was conducted over a period of one week.

After the completion of the post-test, the raw scores were subjected to appropriate statistical analysis.

The same response sheet and scoring procedure were used for both the pre-test and post-test to maintain uniformity in assessment. During the assessment, participants were asked to produce the sign corresponding to each historical personality's name. Their responses were evaluated based on response levels, selected HOLM parameters and response time.

The developed pre-test and post-test response sheet provided a systematic method for evaluating participants' performance before and after the intervention. The same list of 18 historical personalities was used during both pre-test and post-test administration to ensure consistency in assessment.(Appendix 4)

3.6 Reliability of the Tool

To establish the reliability of the assessment tool developed for the present study, the internal consistency of the tool was examined using Cronbach's Alpha. The assessment tool consisted of 18 historical personality name signs selected from the History lesson "Ancient Dynasties of North India." Since all items were intended to assess participants' learning and production of subject-specific historical personality signs, Cronbach's Alpha was considered appropriate for determining the consistency of the assessment tool. The reliability analysis was conducted using the pre-test scores of the participants.

3.5 Internal Consistency Reliability of the Assessment Tool

Reliability Statistics	
Cronbach's Alpha	N of Items
.779	18

Presents the internal consistency reliability of the assessment tool developed for assessing the learning and production of historical personality name signs. The Cronbach's Alpha coefficient obtained for the 18 items was 0.779. According to commonly accepted standards, a Cronbach's Alpha value above 0.70 indicates acceptable internal consistency. Therefore, the obtained coefficient suggests that the assessment tool possesses satisfactory reliability and that the items were sufficiently consistent in measuring participants' performance related to historical personality name signs. Hence, the tool was considered reliable for use in the present study.

3.7 Development of Instructional Objectives

Instructional objectives are clear and specific statements that describe what learners are expected to know or perform after the completion of instruction. According to Dick and Carey (1990), instructional objectives describe what learners will be able to do after completing a unit of instruction.

Based on the selected historical personalities' names, instructional objectives were developed for the present study. These objectives guided the development of the ISL E-Module, pre-test, post-test and learning activities for the trainees.

The objectives also emphasized accurate sign production with respect to handshape, orientation, location, and movement parameters.

3.7 Procedure of Data Collection Employed for the Study

The present study aimed to develop and teach historical personality name signs through an Indian Sign Language (ISL) E-Module for B.Ed. Special Education (HI) trainees who had selected Social Science pedagogy as their specialization subject.

Considerable time was spent selecting appropriate historical personality names and subject-specific words from the Karnataka State Social Science textbook of 6th standard (Second Term). The History lesson titled "*Ancient Dynasties of North India*" was selected because it contains several important and well-known historical personalities. Additional time was also devoted to video recording and editing for the development of the E-Module.

The selected words and historical personalities' names were verified using resources from the Indian Sign Language Research and Training Centre (ISLRTC), RKMVERI resources and NCERT PM e-VIDYA Channel 31 to identify signs that were already available. Based on this verification, the researcher prepared the finalized word list for the study.

The finalized word list was validated by social science teachers from special schools, inclusive school teachers and social science instructors (HI) teaching 6th standard students to ensure educational relevance and suitability. Following the validations process, the researcher studied each historical personalities and collected appropriate photographs and factual information for inclusion in the ISL E-Module. In addition researcher reviewed existing signs of historical personalities available through various resource Indian Sign Language

resources to ensure consistency with established sign development practice and to guide the development of appropriate sign representation for the selected historical personalities.

The collected information was then shared with a Deaf individual for video production. The Deaf individual reviewed the pictures and contextual information related to each historical personality and collaboratively developed meaningful and distinguishable signs based on visual characteristics, contextual relevance, and sign language principles. These signs were recorded and incorporated into the ISL E-Module along with videos, pictures, contextual explanations and practice activities.

For conducting the study, permission was obtained from the concerned participants. The participants were selected based on the objectives of the study and their specialization in Social Science pedagogy. Initially, a pre-test was administered individually to assess the participants' existing sign language performance related to historical personality name signs.

After we did the pre-test we started the ISL E-Module programme. This programme was taught in classes where we showed videos with pictures to help people understand. We also gave explanations that related to life and had practice activities to help people learn the ISL E-Module. The ISL E-Module programme was used to teach people things.

After completion of the intervention, a post-test was conducted individually using the same assessment tool to measure the effectiveness of the ISL E-Module on learning historical personality name signs among B.Ed. Spl. Edu. (HI) trainees. The obtained scores were recorded systematically and subjected to appropriate statistical analysis.

3.8 Procedure for Data Analysis

The data collected from the pre-test and post-test were systematically recorded and entered into Microsoft Excel and subsequently transferred to SPSS (Statistical Package for the Social Sciences) for analysis. Descriptive statistics such as mean, standard deviation, minimum score, maximum score, frequency and percentage were computed to summarize the participants' performance.

The effectiveness of the ISL E-Module was evaluated by comparing the pre-test and post-test scores obtained by the participants. The analysis was carried out for the overall scores, response levels (Finger Spelling, Context-Based Signing and Target Sign), HOLM parameters (Handshape, Orientation, Location and Movement) and response time.

Prior to inferential analysis, the normality of the data was examined using the Shapiro–Wilk test. Since the sample size was small ($N = 17$), non-parametric statistical techniques were considered appropriate where the assumption of normality was not met. The Wilcoxon Signed Rank Test was employed to determine the significance of differences between pre-test and post-test scores. The level of significance was set at 0.05 for all statistical analyses.

CHAPTER 4

RESULT & DISCUSSION

The data collected for the present study were quantitative in nature and were obtained through pre-test and post-test assessment from a single group of B.Ed. Spl. Edu. (HI) teacher trainees. The collected data included response level scores, HOLM parameter scores and time taken for sign production. The data were entered into Microsoft Excel and analyzed using SPSS software. Since the sample size of the study was small ($N = 17$), the normality of the data was checked using the Shapiro–Wilk test. The results showed that the data were not normally distributed. Therefore, the Wilcoxon Signed Rank Test, a non-parametric statistical test, was used to compare the pre-test and post-test scores of the participants. The test was used to identify whether there was a significant improvement in the participants' sign production performance after the administration of the ISL E-Module.

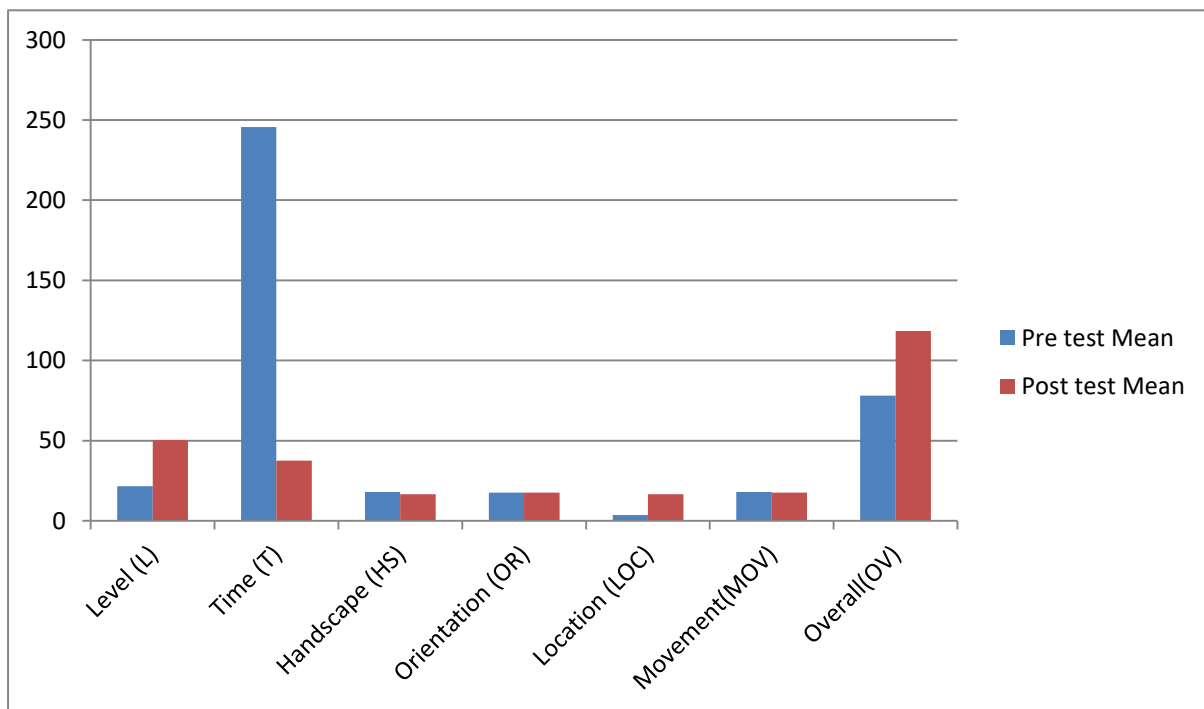
The present study was conducted to investigate the effectiveness of the developed Indian Sign Language (ISL) E-Module in enhancing the learning and production of subject-specific historical personality signs among B.Ed. Spl. Edu. (HI) teacher trainees, the collected data was thus subjected to Descriptive Statistics and Wilcoxin Signed Rank test. The results obtained from the data is discussed below.

4.1: Descriptive Statistics of Pre-Test and Post-Test Score of the Experimental study

		Mean	Median	Std. Deviation	Interquartile Range
Statistic	PR_L_TOT	21.59	22.00	3.280	7
	PO_L_TOT	50.24	51.00	2.658	5
	PR_T_TOT	245.6435	228.9500	48.26397	79.98
	PO_T_TOT	37.5206	38.3600	7.51407	13.77
	PR_HS_TOT	17.94	18.00	.243	0
	PO_HS_TOT	16.53	17.00	1.125	1
	PR_OR_TOT	18.00	18.00	0.00	0
	PO_OR_TOT	17.53	18.00	.717	1
	PR_LOC_TOT	3.59	4.00	3.280	7
	PO_LOC_TOT	16.53	17.00	1.231	1
	PR_MOV_TOT	17.94	18.00	.243	0

	PO_MOV_TOT	17.53	18.00	.717	1
Statistic		Mean	Median	Std. Deviation	Interquartile Range
	PR_OV_TOT	78.06	79.00	6.552	13
	PO_OV_TOT	118.35	119.00	3.278	4

Figure 4.1 Comparison of Mean Scores Obtained in Pre-test and Post-test in the Experimental Study



4.1 shows the descriptive statistics of the pre-test (PR) and post-test (PO) scores obtained by the participants on different parameters, namely Level (L), Time (T), Handsape (HS), Orientation (OR), Location (LOC), Movement (MOV) and Overall Total (OV). The descriptive statistics included Mean, Median, Standard Deviation and Interquartile Range (IQR). The results indicated noticeable differences between pre-test and post-test scores across most parameters after the administration of the ISL E-Module.

In the Level (L) parameter, the post-test mean score (50.24) was considerably higher than the pre-test mean score (21.59), indicating improvement in participants' performance after the intervention. In the Time (T) parameter, the mean response time decreased considerably from 245.64 seconds during the pre-test to 37.52 seconds during the post-test. The time it took for people to respond got shorter after they did the intervention. This means they were able to

make the signs more quickly and easily. The results from the post-test also showed that people did the signs consistently.

For the Handshape part people got a score of 17.94 on the pre-test and 16.53 on the post-test. The post-test score was a little lower than the pre-test score. The test showed that the difference between the two scores was significant. This might be because during the pre-test people mostly used finger spelling, which they already knew from their teacher training. They were using handshapes they were familiar with. During the post-test people had to make signs, for historical personalities that they learned from the ISL E-Module. These signs had handshapes that they were not used to so it was harder for them to get it right. This is probably why they made some mistakes when they were making the signs. The Handshape parameter was affected by this change. The ISL E-Module introduced signs and this is what people had to produce during the post-test.

For the Orientation (OR) parameter, all participants obtained similar scores during the pre-test, resulting in minimal variability in the data. This may be attributed to the consistent orientation patterns associated with finger spelling and familiar sign forms used by the participants. The scores after the test did not vary much which means that people generally did well. When we look at the Location part the average score after the test was 16.53, which's a lot higher than the average score before the test, which was 3.59. This shows that Location really improved after people got help. We saw something with the Movement part. People were better at making signs when they moved their hands after the test compared to before the test. The Movement part of the test showed that people got better at signing after they got help like, with the Location part.

The Overall Total (OV) scores demonstrated marked improvement, with the post-test mean score (118.35) being considerably higher than the pre-test mean score (78.06). The overall score was derived from the combined Level and HOLM parameter scores across the 18 historical personality signs. The increase in the overall score indicates that participants progressed from predominantly finger-spelling and context-based responses during the pre-test towards the accurate production of target historical personality signs during the post-test. This finding suggests that the developed ISL E-Module was effective in enhancing the learning and production of subject-specific historical personality signs among the participants.

The standard deviation and interquartile range values in most post-test scores were lower compared to the pre-test scores, suggesting greater consistency and reduced variability in participants' performance after the intervention. However, slight variations were observed in the Handshape, Orientation, Location and Movement parameters. During the pre-test, many participants mainly relied on finger spelling and contextual communication strategies, where there was comparatively less scope for errors in HOLM parameters. In contrast, during the post-test, participants were assessed on the production of the newly developed ISL signs, which required accurate use of handshape, orientation, location, and movement. So the ISL E-Module had some room for mistakes when people were making the signs they learned.. Even with that the people who used the ISL E-Module did a lot better on the tests after they finished it. This shows that the ISL E-Module really works to help people learn and make signs better.

The ISL E-Module made a difference in a few areas. It really helped with the Level and Location of the signs. The people who used the ISL E-Module got higher scores, on these parts after they finished the module compared to when they started. The improvement in Level scores indicates that participants progressed from finger spelling (L1) and context-based signing (L2) towards the accurate production of targeted historical personality signs (L3) following the intervention. This finding suggests that the ISL E-Module successfully facilitated the acquisition and use of subject-specific signs among the participants. In contrast, different parameters, comparatively lesser improvement was observed in the Orientation (OR) and Movement (MOV) parameters, possibly because these parameters required accurate spatial orientation, movement coordination, and recall during sign production. During the pre-test, many participants mainly relied on finger spelling and contextual communication, where precise orientation and movement were less emphasized. Similar findings were reported by Sanders (2018) in the study *Some Issues in the Perceptual Phonetics of Sign Language*, which highlighted that certain sign movements are comparatively difficult to perceive and produce due to visual and motor coordination demands.

4.2 Wilcoxon Signed Ranks Test Statistics across the Parameters

	Z	Asymp. Sig. (2-tailed)
PO_L_TOT – PR_L_TOT	-3.623 ^b	.001
PO_T_TOT - PR_TM_TOT	-3.621 ^c	.001
PO_HS_TOT - PR_HS_TOT	-3.225 ^c	.001
PO_OR_TOT - PR_OR_TOT	-2.271 ^c	.023
PO_LOC_TOT - PR_LOC_TOT	-3.635 ^b	.001
PO_MOV_TOT- PR_MOV_TOT	-2.333 ^c	.020
PO_OV_TOT –PR_OV_TOT	-3.625 ^b	.001

The results of the Wilcoxon Signed-Rank Test conducted to compare the pre-test and post-test scores of the participants on different parameters, namely Level (L), Time (T), Handshape (HS), Orientation (OR), Location (LOC), Movement (MOV) and Overall Total (OV). The Wilcoxon Signed-Rank Test was used as a non-parametric statistical test to examine the significance of differences between pre-test and post-test scores.

The findings revealed statistically significant differences between pre-test and post-test scores across all parameters, as the obtained p-values were less than 0.05. In the Level parameter, a significant improvement was observed between pre-test and post-test scores ($Z = -3.623$, $p = .001$). Similarly, the Time parameter showed a statistically significant difference between the pre-test and post-test scores ($Z = -3.621$, $p < .001$), indicating that participants required significantly less time to produce the signs following the administration of the ISL E-Module.

For the Handshape parameter, a significant difference was found between pre-test and post-test scores ($Z = -3.225$, $p = .001$). Although the post-test mean score was slightly lower than the pre-test mean score, the significant difference may be attributed to the transition from familiar finger-spelling handshapes during the pre-test to the production of newly learned historical personality name signs during the post-test, which involved unfamiliar handshape configurations and therefore provided greater scope for minor inaccuracies. Likewise, significant differences were observed in Orientation ($Z = -2.271$, $p = .023$), Location ($Z = -3.635$, $p = .001$) and Movement ($Z = -2.333$, $p = .020$) parameters. The Overall Total score also showed a statistically significant improvement between pre-test and post-test performance ($Z = -3.625$, $p = .001$).

These findings indicated that the developed ISL E-Module was effective in improving the learning and production of subject-specific historical personality signs among the participants. The significant improvement in HOLM parameters further suggested enhancement in the accuracy of sign production after the intervention.

Discussion of the Study

The present study was conducted to investigate the effectiveness of the developed Indian Sign Language (ISL) E-Module in enhancing the learning and production of subject-specific historical personality signs among B.Ed. Spl. Edu. (HI) teacher trainees. The descriptive statistics and Wilcoxon Signed-Rank Test showed that there was a significant improvement in the performance of the participants after the administration of the ISL E-Module.

Descriptive statistics indicated noticeable differences between the pre-test and post-test mean scores across all parameters, namely Level, Time, Handshape, Orientation, Location, Movement and Overall Total scores. Most of the results showed scores after the test than before the test. This means participants learned and got better at making signs after using the ISL E-Module. The overall scores got better which suggests that the E-Module helped people understand remember and make signs related to history better.

The Wilcoxon Signed-Rank Test showed that the ISL E-Module really worked. It found differences between the scores before and after the test for all parts. The scores for Level, Time, Handshape, Orientation, Location, Movement and Overall Total all improved a lot. The p-values were all, than 0.05, which is a strong sign that the ISL E-Module was effective. These findings indicated that the ISL E-Module significantly enhanced participants' ability to learn and accurately produce the developed signs.

During the pre-test, participants primarily relied on finger spelling and contextual communication strategies. Therefore, there was comparatively less scope for errors in HOLM parameters during pre-test performance. However, during the post-test, participants were required to produce newly learned historical personality signs accurately using appropriate handshape, orientation, location and movement. This created greater scope for minor inaccuracies and forgetting while producing the signs. Despite these challenges, the participants demonstrated considerable improvement in sign production performance after the intervention. Similar findings were reported by Woolsey, Herring, and Satterfield (2009), who emphasized the importance of sign-based Social Studies instruction and effective

communication strategies for improving learning outcomes among deaf and hard-of-hearing students.

The findings of the study emphasized that structured visual learning through an ISL E-Module could effectively support the acquisition of subject-specific vocabulary and improve sign production skills among pre-service teacher trainees. The study also highlighted the educational importance of developing standardized ISL signs for Social Science concepts and historical personalities to promote accessible and inclusive classroom communication for students with hearing impairment.

- Overall, the findings demonstrated that the developed ISL E-Module was effective in improving the learning, retention and production of subject-specific historical personality signs among B.Ed. Spl. Edu. (HI) teacher trainees. Thus the Ho (Null Hypothesis) framed that is there is no significant effect of the ISL E-Module on B.Ed Special Education (HI) teacher trainees' ability to learn and use subject-specific vocabulary of social science (History) Karnataka textbook State Syllabus for 6th standard for students with hearing Impairment is rejected and the alternate hypothesis is accepted.

CHAPTER 5

SUMMARY AND CONCLUSION

The present study was conducted to improve subject-specific Indian Sign Language (ISL) skills among B.Ed. Spl. Edu. (HI) teacher trainees. Although various ISL resources are available through organizations such as ISLRTC and NCERT, limited training materials focus on subject-specific social science signs, particularly historical personality signs. Therefore, the present study focused on developing and evaluating an ISL E-Module to train teacher trainees in learning and producing subject-specific historical personality signs.

The review of literature highlighted the importance of Indian Sign Language (ISL), teacher training and accessible teaching-learning materials for students with hearing impairment. The reviewed studies and policy frameworks emphasized that effective sign language instruction, structured training programmes and technology-based learning resources can improve communication and learning outcomes for deaf learners. The literature further revealed that Social Science is a language-intensive subject requiring subject-specific vocabulary and clear conceptual explanation. However, limited studies were found on subject-specific ISL E-Modules, particularly for training pre-service teacher trainees in historical personality signs and social science content. Therefore, the review established the need for developing and evaluating an ISL E-Module to strengthen subject-specific sign learning and instructional preparedness among B.Ed. Spl. Edu. (HI) teacher trainees.

The current study used a pre-experimental single-group pre-test and post-test strategy to assess the efficacy of the produced ISL E-Module. The study included 17 B.Ed. Spl. Edu. (HI) teacher trainees with a focus on Social Science pedagogy.

The ISL E-Module was created using the 6th standard Karnataka state social science History chapter "*Ancient Dynasties of North India*". A total of 18 signs representing historical personalities were developed with the assistance of social science teachers, sign language interpreters and Deaf professionals.

The subjects went through pre-test, intervention and post-test procedures. Their performance was evaluated in terms of response levels, HOLM parameters and time taken for sign production. The acquired data was analysed via descriptive statistics and the Wilcoxon Signed-Rank Test. The results of the Shapiro–Wilk test indicated that the data were not

normally distributed. Therefore, the Wilcoxon Signed-Rank Test was employed to compare the pre-test and post-test scores. The findings revealed statistically significant differences across all assessed parameters, indicating the effectiveness of the developed ISL E-Module.

The findings of the present study revealed that the developed Indian Sign Language (ISL) E-Module was effective in improving the learning and production of subject-specific historical personality signs among B.Ed. Spl. Edu. (HI) teacher trainees. The analysis of pre-test and post-test performance showed significant improvement across different parameters such as Level, Time, Handshape, Orientation, Location, Movement and Overall performance after the administration of the ISL E-Module. The results obtained through the Wilcoxon Signed-Rank Test further confirmed that the improvement in participants' performance was statistically significant. Among the different parameters, the greatest improvement was observed in the Level parameter, while substantial improvement was also observed in the Location parameter. The Time parameter also showed considerable improvement, as the participants required less time for sign production during the post-test, reflecting increased fluency and familiarity with the developed signs. However, comparatively lesser improvement was observed in the Orientation and Movement parameters, possibly because these parameters required precise spatial coordination, movement accuracy, and recall during sign production. Similar findings were reported by Sanders (2018), who stated that certain sign movements are comparatively difficult to perceive and produce due to visual and motor coordination demands.

The study also stressed how important it is to create hand signs for Social Science subjects. Before the training lots of people used finger spelling. Took clues from the situation to communicate. This was mainly because there were no hand signs for many famous people, from history. After the training people were more accurate, confident and fluent when making signs. Similar findings were supported by Woolsey, Herring, and Satterfield (2009), who highlighted the importance of sign-based Social Studies instruction and effective communication strategies for improving learning outcomes among deaf and hard-of-hearing students.

Thus, the objectives of developing an ISL E-Module, training teacher trainees and evaluating its effectiveness were successfully achieved. The findings of the study indicated that the objectives of selecting subject-specific historical personality names, developing an Indian Sign Language (ISL) E-Module, training B.Ed. Spl. Edu. (HI) teacher trainees and evaluating

the effectiveness of the E-Module were successfully achieved. The results demonstrated that the developed ISL E-Module effectively enhanced the learning, retention and production of subject-specific historical personality signs among the participants. The findings of the study led to the rejection of the null hypothesis, which stated that there would be no significant effect of the ISL E-Module on teacher trainees' learning and use of subject-specific social science vocabulary. Since a significant difference was found between the pre-test and post-test performance scores, the alternate hypothesis was accepted. Therefore, it was concluded that the developed ISL E-Module served as an effective instructional tool for improving subject-specific sign language proficiency among B.Ed. Spl. Edu. (HI) teacher trainees.

Limitations of the Study

- The study was conducted on a small sample of 17 B.Ed. Spl.Edu. (HI) teacher trainees, which limited the generalization of the findings.
- The study followed a single- group pre-test and post-test design without control group.
- Although the selected chapter contained several abstract concepts, place names and other subject-specific vocabulary, the study focused only on historical personality signs for the development of the ISL E-Module.
- Due to limitations of time and availability of deaf individuals and experts for validation and sign development, all abstract concepts and place name signs from the chapter could not be included in the study.
- The study assessed only the immediate effectiveness of the ISL E-Module and long-term retention of sign learning was not examined.
- The study mainly focused on sign production performance and did not assess the classroom teaching effectiveness of the participants during actual teaching practice.

Recommendations

Recommendation for Teacher Trainees and Teacher Education Programmes

- Structured ISL-based E-Modules should be incorporated into teacher training programmes to improve subject-specific communication skills among pre-service teachers working with students with hearing impairment.
- Teacher trainees should be provided with regular practice of HOLM parameters, to improve accuracy and fluency in sign production.

- Greater emphasis should be given to Orientation and Movement parameters through repeated demonstrations, visual feedback and practical sign production exercise, as these parameters were comparatively more difficult for participants.
- The developed ISL E-Module may be integrated into teacher training programmes to help pre-service teacher trainees learn subject-specific signs along with basic Indian Sign Language skills for effective classroom communication.
- The use of visual teaching strategies, sign-supported instruction and interactive learning materials may further support trainees in delivering social science lesson plans effectively to students with hearing impairment.

Recommendations for Further Research

- Similar studies may be conducted on larger sample sizes and include general B.Ed trainees for better generalization of findings and inclusive practice.
- Future researcher may use experimental and control group designs to obtain more reliable findings regarding the effectiveness of ISL E-Modules.
- Further studies may focus on the development of ISL signs for other school subjects such as Science, Mathematics, Geography and Language.
- Future research may also develop other abstract concepts, place name signs and other subject-specific important vocabulary in addition to historical personality signs.
- Long-term retention of sign learning may be assessed through follow-up studies and delayed post-tests.
- Future studies may investigate the classroom effectiveness of ISL E-Module during actual teaching practice among pre-service teachers.
- Researchers may also explore the use of technology-based interventions, such as interactive videos, mobile applications and digital sign language resources, for improving ISL learning and teaching.
- Future research may focus on classifying already developed ISL signs subject-wise. Permission may also be obtained from ISLRTC to provide links to existing sign videos alongside newly developed signs, thereby supporting effective learning and classroom communication among teacher trainees.

Reference

- Alawajee, O. (2022).** *Exploring the sign language proficiency of university undergraduate students in a preservice preparation program for teachers of deaf students.* *Higher Education Pedagogies*, 7(1), 65–87. <https://doi.org/10.1080/23752696.2022.2092882>
- Alawajee, O. A. (2023).** *Pre-service special educators' levels of readiness to learn sign language.* *Online Journal of Communication and Media Technologies*, 13(2), e202311. <https://doi.org/10.30935/ojcmt/12922>
- Amir, A. H. L., & Aziz, A. A. (2025).** *Teachers' perspective on using sign language in English instruction: Challenges in Malaysian primary school.* *International Journal of Research and Innovation in Social Science*, 9(10), 8584–8594. <https://doi.org/10.47772/IJRIS.2025.910000698>
- Andzik, N. R., Chung, Y.- C., Doneski-Nicol, J., & Dollarhide, C. T. (2017).** *AAC services in schools: A special educator's perspective.* *Communication Disorders Quarterly*, 39(2), 89–97. <https://doi.org/10.1080/20473869.2017.1368909>
- Assam State School Education Board, Division-II. (2025).** *Fundamentals of Sign Language: A textbook on the subject "Sign Language" for Class XI (1st ed., English version).* Guwahati, Assam: HD International Educational Publishers.
- Baker, A., van den Bogaerde, B., Pfau, R., & Schermer, T. (Eds.). (2016).** *The linguistics of sign languages: An introduction.* John Benjamins Publishing Company. <https://doi.org/10.1075/2.199>
- Beveridge, S. (1999).** *Special Educational Needs in Schools (2nd ed.).* Routledge. Bintoro, T., Fahrurrozi, Kusmawati, A. P., & Dewi, R. S. (2023). *The teacher strategies in teaching sign language for deaf students in special schools* Jakarta. *Cogent Education*, 10(1), Article 2258294. <https://doi.org/10.1080/2331186X.2023.2258294>
- Costigan, F. A., & Light, J. (2010).** *A review of preservice training in augmentative and alternative communication for speech-language pathologists, special education teachers, and occupational therapists.* *Assistive Technology*, 22(4), 200–212. <https://doi.org/10.1080/10400435.2010.492774>

- Emmorey, K., Mehta, S., McCullough, S., & Grabowski, T. J. (2016).** *The neural circuits recruited for the production of signs and fingerspelled words.* *Brain and Language*, 160, 30–41. <https://doi.org/10.1016/j.bandl.2016.07.003>
- Wiyanarti, E., Holilah, M., Zahra, T. F., & Che Dahalan, S. (2024).** *Development of an e-module based on local wisdom ethnoastronomy in the digital era to strengthen the pedagogical competence of social studies teachers.* *Journal of Engineering Science and Technology*, 19(4), 1280–1301.
- World Federation of the Deaf. (2016).** *WFD position paper on inclusive education.* <https://wfdeaf.org/>
- Flores, C., & Dada, S. (2025).** *The effect of AAC training programs on professionals' knowledge, skills and self-efficacy in AAC: A scoping review.* *Augmentative and Alternative Communication*, 41(1), 65–77. <https://doi.org/10.1080/07434618.2024.2381462>
- Faltaous, S., Winkler, T., Schneegass, C., Gruenefeld, U., & Schneegass, S. (2022).** *Understanding challenges and opportunities of technology-supported sign language learning.* In *Proceedings of the Augmented Humans Conference 2022* (pp. 15–25). Association for Computing Machinery. <https://doi.org/10.1145/3519391.3519396>
- Gallaudet University Archives. (n.d.).** *History of Deaf education and Charles-Michel de l'Épée.* <https://www.gallaudet.edu/>
- Geer, L. C., & Keane, J. (2018).** *Improving ASL fingerspelling comprehension in L2 learners with explicit phonetic instruction.* *Language Teaching Research*, 22(4), 439–458. <https://doi.org/10.1177/1362168816686988>
- Gangrade, J., & Bharti, J. (2020).** *Vision-based hand gesture recognition for Indian sign language using convolution neural network.* *IETE Journal of Research*, 69(2), 723–732. <https://doi.org/10.1080/03772063.2020.1838342>
- Hamdan, H., et al. (2021).** *Towards Hybrid Multimodal Manual and Non-Manual Arabic Sign Language Recognition.* *Electronics*, 10(14), 1739.

- Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., & Rathmann, C.** (2014). Ensuring language acquisition for deaf children: What linguists can do. *Language*, 90(2), e31–e52. <https://doi.org/10.1353/lan.2014.0036>
- Hosemann, J., Herrmann, A., Sennhenn-Reulen, H., Schlesewsky, M., & Steinbach, M.** (2018). Agreement or no agreement. ERP correlates of verb agreement violation in German sign language. *Language, Cognition and Neuroscience*, 33(9), 1107–1127. <https://doi.org/10.1080/23273798.2018.1465986>
- Indian Sign Language Research and Training Centre, & National Council of Educational Research and Training.(n.d).** NCERT textbooks in Indian Sign Language.Government of India.<https://islrhc.nic.in/ncert-books-in-isl/>
- Indian Sign Language Research and Training Centre.(n.d).** ISLRTC official website. Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment, Government of India.<https://www.islrhc.nic.in/>
- Indian Sign Language Research and Training Centre. (2024).** Annual report 2023–24. Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment, Government of India. <https://islrhc.nic.in/>
- Kathuria, S., & Chauhan, S. (2021).** Usage of sign language in developing science practical skills among the learners with hearing impairment in inclusive schools.*International Journal of Rehabilitation and Special Education (IJRSE)*, 1(1), 36–52. <https://doi.org/10.48165/IJRSE.2021.1103>
- Konga, D. J., & Cheboi, S. T. (2021).** Influence of school resources on academic performance of visually impaired learners in integrated public primary schools in Baringo County, Kenya. *European Journal of Special Education Research*, 7 (2). <https://doi.org/10.46827/ejse.v7i2.3826>
- Kulhade, P. K., & Kumar, A. (2022).** Challenges faced by students with hearing impairment in an inclusive setup (special reference to Jaipur, Rajasthan). *Towards Excellence*, 14(2), 1995–2005. <https://doi.org/10.37867/te1402167>
- Kwizera, M. D. (2021).** Challenges and competence in teaching in inclusive classrooms in Rwanda (Master's thesis, University of Gothenburg).University of Gothenburg. <http://hdl.handle.net/2077/69375>

Lane, H. (1984). *When the mind hears: A history of the Deaf*. Random House.

Lee, B., & Secora, K. (2022). *Fingerspelling and its role in translanguaging*. *Languages*, 7(4), 278. <https://doi.org/10.3390/languages7040278>

Luqman, H., & El-Alfy, E.-S.M. (2021). *Towards hybrid multimodal manual and non-manual Arabic sign language recognition: mArSL database and pilot study*. *Electronics*, 10(14), 1739. <https://doi.org/10.3390/electronics10141739>

Liu, H. T., Hsieh, H. H., Lin, W. Y., Andrews, J. F., & Liu, C. J. (2024). *Sign language support in an inclusive environment: Educational sign language interpreting services in Taiwan*. *Deafness & Education International*, 26 (1), 37–57.

<https://doi.org/10.1080/14643154.2024.2302703>

Marschark, M., Pelz, J. B., Convertino, C., Sapere, P., Arndt, M. E., & Seewagen, R. (2005). *Classroom interpreting and visual information processing in mainstream education for deaf students*. *American Educational Research Journal*, 42(4), 727–761. <https://doi.org/10.3102/00028312042004727>

Middleton, A., Niruban, A., Girling, G., & Myint, P. K. (2010). *Communicating in healthcare settings with people who have hearing loss*. *BMJ: British Medical Journal*, 341, c4672. <https://doi.org/10.1136/bmj.c4672>

Ministry of Education.(2020). *“National Education Policy 2020”*. Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

Ministry of Law and Justice.(2016). *“The Rights of Persons with Disabilities Act, 2016”*. Government of India. https://legislative.gov.in/sites/default/files/A2016-49_1.pdf

Moore, D. (2001). *“Educating the deaf: Psychology, principles, and Practice”*. Houghton Mifflin Company.

Muriithi, S. B. (2022). *“Utilization of assistive technology in improving academic performance in primary schools for learners with hearing challenges in Meru and TharakaNithi Counties, Kenya”* (Doctoral dissertation, Kenya Methodist University).

- Muzani, M., Fatimah, A. N., Imsa, M. A., & Casmana, A. R. (2022).** *The obstacles hierarchy of school disaster preparedness implementation in Mount Sinabung area, Indonesia.* *Frontiers in Education*, 7, 842990. <https://doi.org/10.3389/feduc.2022.842990>
- National Steering Committee for National Curriculum Framework. (2023).** *National Curriculum Framework for School Education (NCFSE) 2023.* New Delhi: Ministry of Education, Government of India.
- Pawa, A. (2024).** *“Exploring the need for interactive e-learning modules”.* *Magic EdTech.* <https://www.magicedtech.com/blogs/exploring-the-need-for-interactive-e-learning-modules/>
- Rani, A. (2024).** *“Inclusive education in NEP 2020: Creating equal opportunities for all”.* *“International Journal of Innovative Research in Technology (IJIRT), 11” (6), 623–625.* https://ijirt.org/publishedpaper/IJIRT169292_PAPER.pdf
- Robert, G., & Mkulu, D. G. (2023).** *Challenges facing students with hearing impairment in inclusive classroom in public secondary school in Mabira Secondary School in Kyerwa District, Tanzania.* *Asian Journal of Education and Social Studies*, 49(3), 339–353. <https://doi.org/10.9734/AJESS/2023/v49i31160>
- Rodríguez-Fuentes, A., Aláin-Botaccio, L., & García-García, F. (2022).** *“Presentation and evaluation of a digital tool for sign language (Presentación y evaluación de unaherramienta digital para la lengua de signos)”.* *“Culture and Education, 34” (3), 658–688.* <https://doi.org/10.1080/11356405.2022.2058793>
- Sanders, N. (2018).** *Some issues in the perceptual phonetics of sign language: Motion-in-depth and the horizontal-vertical illusion.* *Toronto Working Papers in Linguistics*, 40. <https://twpl.library.utoronto.ca/index.php/twpl/article/view/29190>
- Sarkar, R., & Ghosh, A. (2024).** *Challenges faced by students with hearing impairment in higher education: A comprehensive analysis.* *International Journal of Academic Research and Development*, 5(1a), Article 43. <https://doi.org/10.22271/27103846.2024.v5.i1a.43>

- Schick, B. (2003).** *The Development of American Sign Language and Manually Coded English Systems.* Oxford Handbook of Deaf Studies, Language, and Education.
- Sibanda, S., & Mhlanga, B. (2024).** Knowledge and readiness of teachers in implementing augmentative and alternative communication. *Discover Education*, 3, Article 118.
- Shoaib, M., Fatima, G., & Baig, M. U. (2023).** Problems faced by master trainers in sign language skills acquisition during in-service training of special education teachers at district level Punjab. *Review of Education, Administration and Law (REAL)*, 6(2), 241–251. DOI: 10.47067/real.v6i2.321
- Stokoe, W. C. (1960).** *Sign Language Structure: An Outline of the Visual Communication Systems of the American Deaf.* Studies in Linguistics.
- Tang, G. (2024).** Sign language and inclusive deaf education: An Asian perspective. *Deafness & Education International*, 26 (1), 15.
<https://doi.org/10.1080/14643154.2024.2302702>
- United Nations. (2006).** *Convention on the Rights of Persons with Disabilities.*
https://legal.un.org/avl/pdf/ha/crpd/crpd_e.pdf
- United Nations. (2006).** *Convention on the Rights of Persons with Disabilities: Resolution adopted by the General Assembly on 13 December 2006 (A/RES/61/106).*
<https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>
- United Nations. (1993).** *Standard rules on the equalization of opportunities for persons with disabilities.*
<https://www.un.org/development/desa/disabilities/standard-rules-on-the-equalization-of-opportunities-for-persons-with-disabilities.html>
- Walker, V. L., Douglas, K., Wang, C., & Li, Z. (2022).** Special education teachers' perspectives of effective pre-service training practices in systematic instruction for students with extensive support needs. *International Journal of Developmental Disabilities*, 68(5), 582–593. <https://doi.org/10.1080/20473869.2022.2110362>
- Woolsey, M. L., Herring, T. J., & Satterfield, S. T. (2009).** Social studies instruction in signing programs for deaf and hard of hearing students: An ecobehavioral assessment. *American Annals of the Deaf*, 154(4), 400–412.
<https://doi.org/10.1353/aad.0.0108>

www.ijtsrd. (2025). In @ IJTSRD | Unique Paper ID - IJTSRD78493 | Volume - 9 | Issue - 2 | Mar-Apr 2025 Page 698 NPE 1986 and NEP 2020 on Inclusive Education in India a Comparative Study UmasankarMandal Teacher (Vol. 9).

Zeshan, U., Vasishta, M. M., &Sethna, M. (2005). Implementation of Indian Sign Language in educational settings.Asia Pacific Disability Rehabilitation Journal

Appendix 1

3.1 First List of Selected Historical Personalities Name

Chapter 12: Ancient Dynasties of North India

Sr. No.	Person Names	Tick the Most Important words
1	Chandragupta Maurya	
2	Vishnugupta (Kautiyla/ Chanakya)	
3	Dhanananda	
4	Alexander of Macedonia	
5	SeleucusNicator	
6	Magasthenes	
7	R. Shamashastri	
8	Bindusara	
9	Ashoka	
10	James Princep	
11	Kanishka	
12	Aswaghosha	
13	Nagarjuna	
14	Vasumitra	
15	Charaka	
16	Samudragupta (Available)	
17	Chandragupta II/ Vikramaditya	
18	Harisena	
19	Vasubandhu	
20	Fa-hein	
21	Kalidasa	
22	Shudraka	
23	Vishnu Datta	
24	Vishnu Sharma	
25	Amara Simha	
26	Aryabhata	
27	Vagbhata	

28	PrabhakaraVardhanas	
29	Rajyavardhana	
30	Harshavardhana	
31	Rajyashree	
32	Grihavarman	
33	Shashanka	
34	Pulikeshi II	
35	Hu-en-Tsang	
36	Banabhatta	
37	Raja Durlabhavardhana (Karkota Empire)	
38	Lalithaditya	
39	Abhinavagupta	
40	Raja Mansingh	
41	Queen Mriganayane	
42	Jayadeva	
43	Dharmapala	
44	Prithviraj III	
45	Samyukta	
46	Jayachandra	
47	Muhammad Ghor	
48	RanaSanga/RanaSangramaSimha	
49	Shan prince Sukapa (Ahom Dynasty)	
50	SuhamMung	
51	Supatha	
52	LachitBorphukan	
53	Boor Kuvari	
54	ParvtiyaKuvari	
55	Rajdangiyakuvari	
56	TamuliKuvari	
57	King Chakradwaja Singha	

Appendix 2

3.2 Validated Word list

Sr. No.	Person Names
1	Chandragupta Maurya
2	Vishnugupta (Kautiyla/ Chanakya)
3	Magasthenes
4	Bindusara
5	Ashoka
6	James Princep
7	Kanishka
8	Aswaghosha
9	Charaka
10	Samudragupta (Available)
11	Chandragupta II/ Vikramaditya
12	Harisena
13	Fa-hein
14	Kalidasa
15	Vishnu Sharma
16	Aryabhata
17	Vagbhata
18	Harshavardhana
19	Pulikeshi II
20	Hu-en-Tsang
21	Banabhatta
22	Jayadeva
23	Prithviraj III
24	Muhammad Ghori
25	RanaSanga/RanaSangramaSimha

Appendix 3

3.3 The following historical personalities' names were selected for the study and included in the ISL E-Module:

Sr. No.	Person Names
1	Magasthenes
2	Bindusara
3	James Princep
4	Aswaghosha
5	Charaka
6	Harisena
7	Fa-hein
8	Vishnu Sharma
9	Aryabhata
10	Vagbhata
11	Harshavardhana
12	Pulikeshi II
13	Hu-en-Tsang
14	Banabhatta
15	Jayadeva
16	Prithviraj III
17	Muhammad Ghori
18	RanaSanga/RanaSangramaSimha

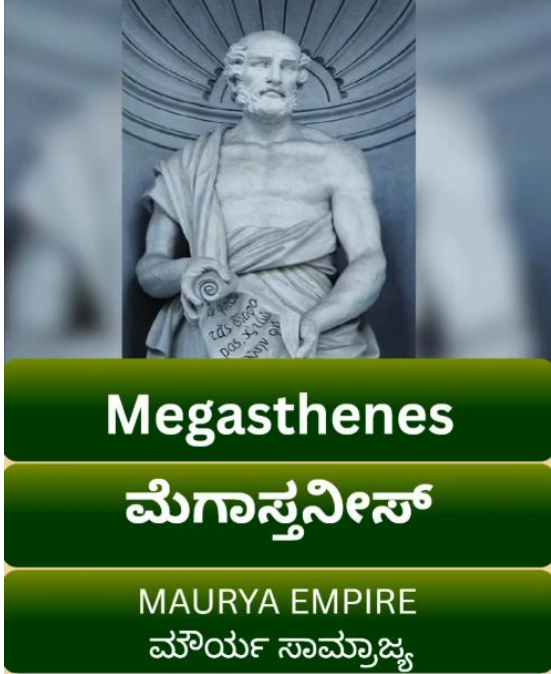
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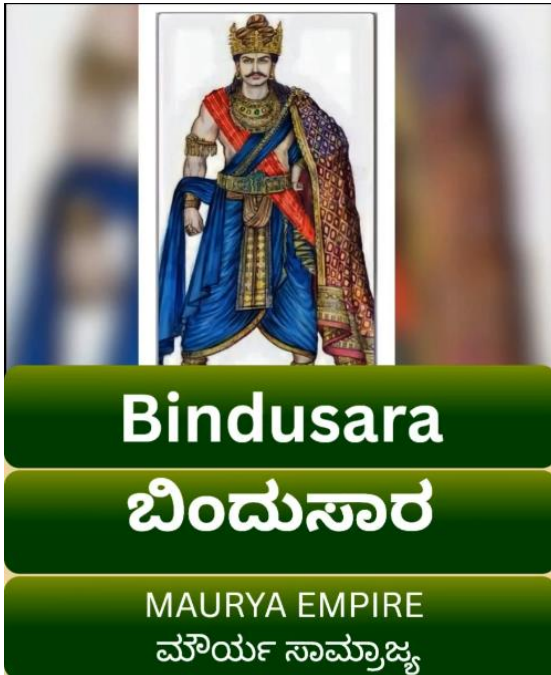
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ISL E-Module

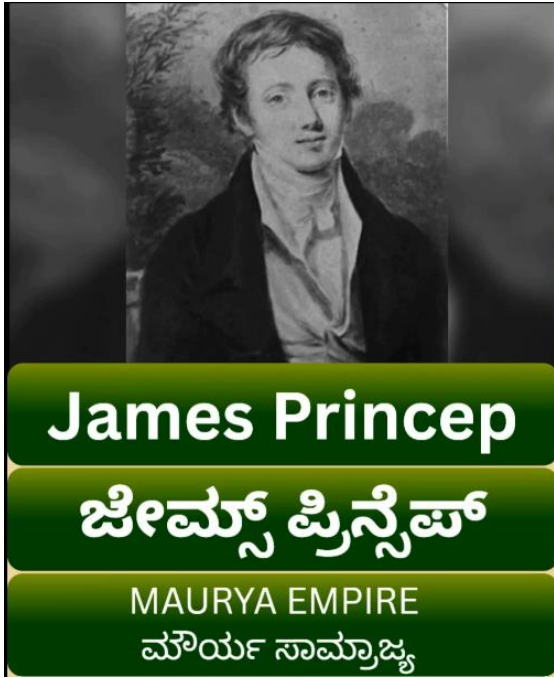
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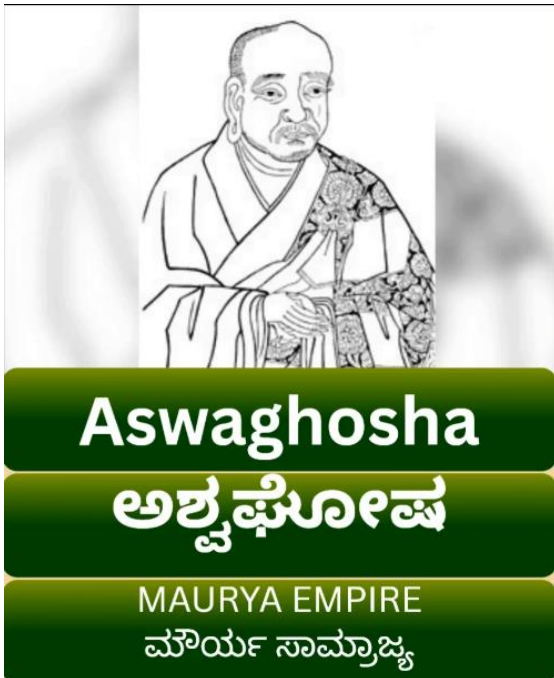
2.



3.



4.



5.



Charaka

ಚರಕ

MAURYA EMPIRE

ಮೌರ್ಯ ಸಾಮ್ರಾಜ್ಯ



6.



Harisena

ಹರಿಸೇನ

GUPTA EMPIRE

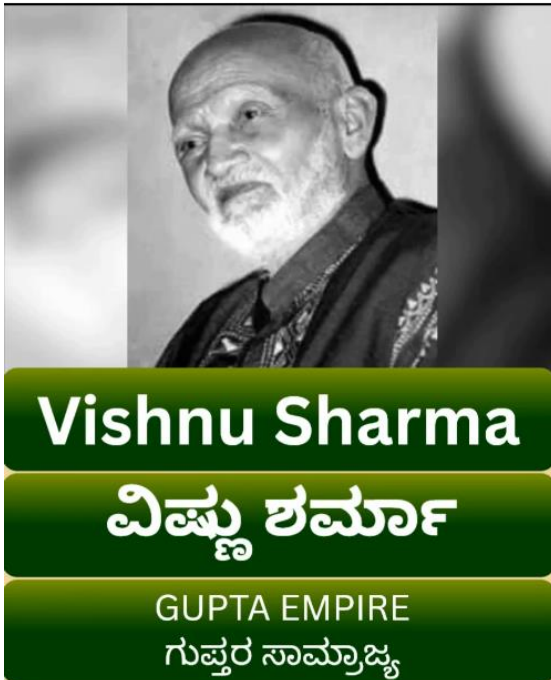
ಗುಪ್ತರ ಸಾಮ್ರಾಜ್ಯ



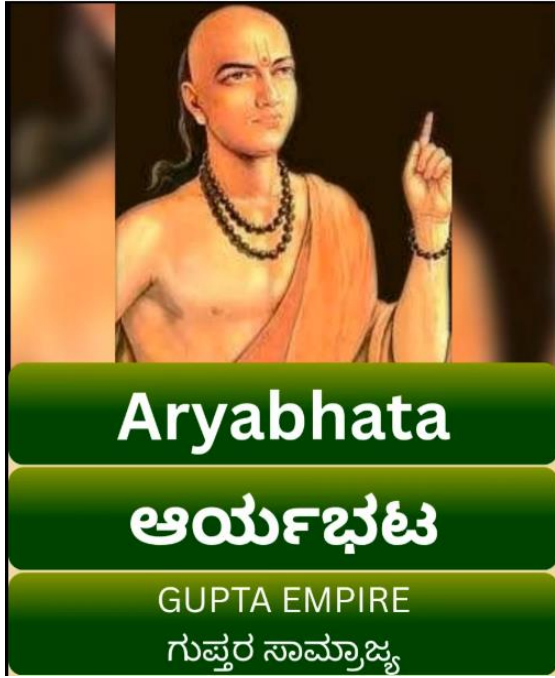
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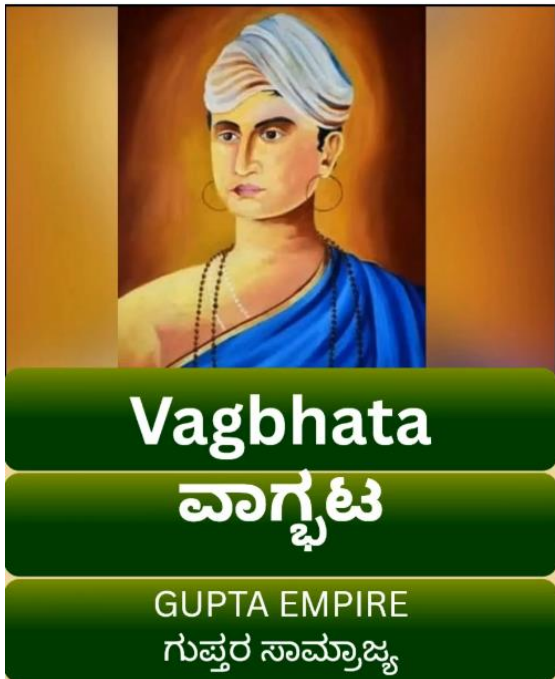
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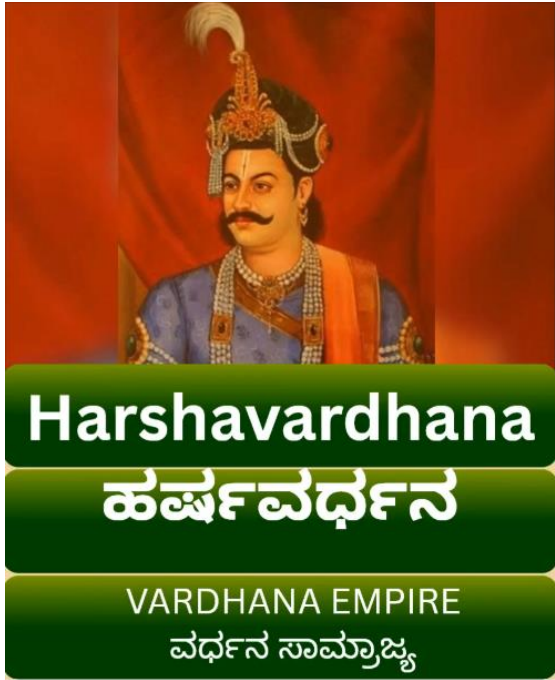
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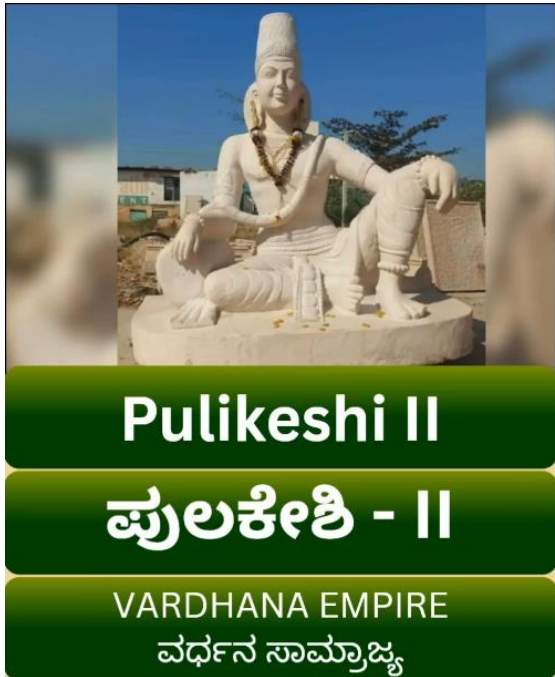
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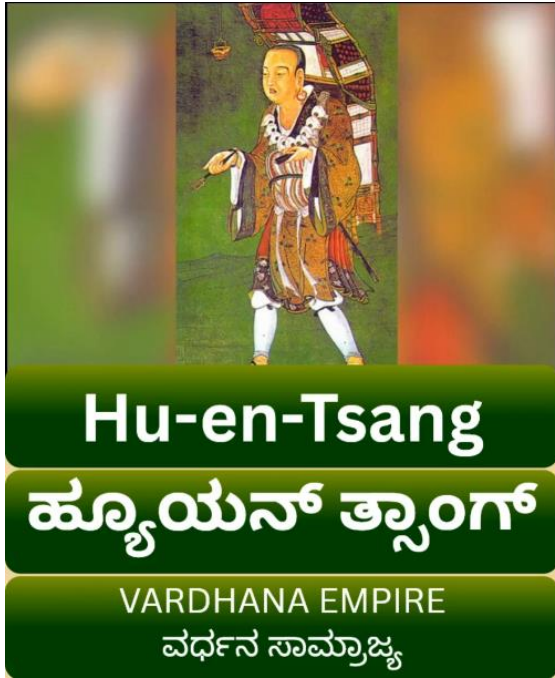
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12.



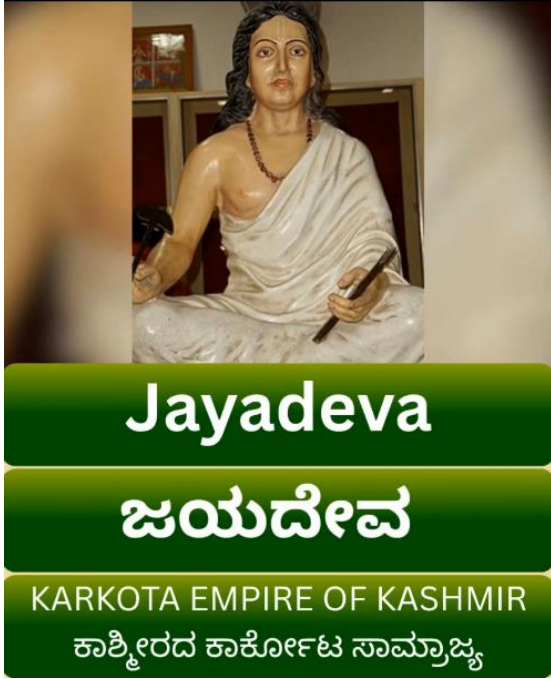
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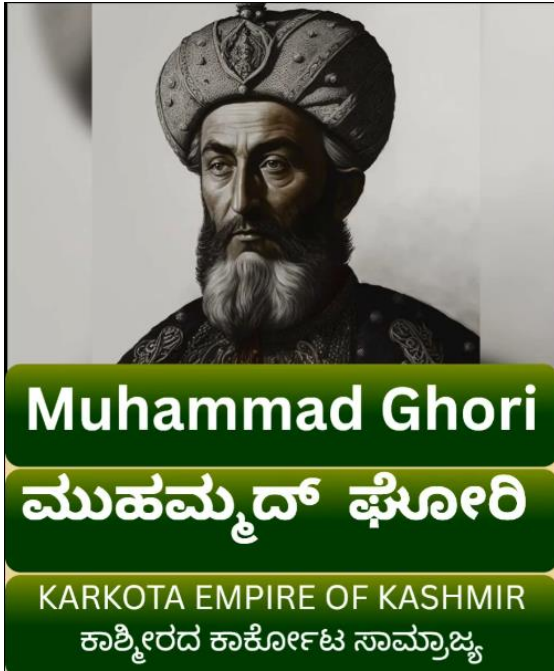
15.



16.



17.



18.



Appendix 6

ISL E-Module Video Link and QR Code

Canva Public View link: <https://canva.link/r878p57ev4snjjw>

QR Code:



Note: Scan the QR code to access all videos included in the ISL E-Module.